BIOPROSPECTING FOR BLUE GOLD IN THE HIGH SEAS

Regulatory options for access and benefit-sharing

University of Oslo

Faculty of Law

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Content

List of acronyms

ABNJ	Areas beyond national jurisdiction
ABS	Access and benefit-sharing
ATCM	Antarctic Treaty Consultative Meeting
ATS	Antarctic Treaty System
CBD	Convention on Biological Diversity
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CGIAR	Consultative Group on International Agricultural Research
COP	Conference of the parties
EEZ	Exclusive economic zone
EPC	European Patent Convention
FAO	Food and Agriculture Organization of the United Nations
GR	Genetic resources
IMO	International Maritime Organization
IPR	Intellectual property rights
ISA	International Seabed Authority
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
MOP	Meeting of the parties
MPA	Marine protected areas
MSR	Marine scientific research
NP	Nagoya Protocol
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
R&D	Research and development
RFMO	Regional Fisheries Management Organisation
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UN	United Nations
UNCED	United Nations Conference on Environmental Development
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNTS	United Nations Treaty Series
VCLT	Vienna Convention on the Law of Treaties

1. Introduction

1.1. Theme

Oceanic life is as diverse as it is a mystery. Understanding of its diversity is continuously expanding. In spring 2012 over two hundred thousand marine species had been identified[1] and yet experts estimate that at the very minimum the real number is five times as high.[2] In addition, and as a cornerstone for all marine life, microbial life constitutes 90 per cent of all oceanic biomass and is thought to be composed of no fewer than a billion kinds of microbes.[3] Vast areas of the seas remain unexplored. For more than 20 per cent of the ocean's volume, even the most comprehensive databases still have no records at all of marine biodiversity.[4] Despite the growing list of known marine life, the oceanic realm faces loss of diversity and abundance as pollution, climate change, ocean acidification and extensive fishing take their toll.

Due to technological progress of genomics and bioinformatics in recent years, more attention has been directed toward the great unknown of the oceans, both from industry and policymakers. The properties of marine organisms provide the industry with a set of keys to success. Discovering, researching and developing the unique traits that living organisms develop as a result of adapting to specific conditions may lead to scientific and commercial success. Though revenue estimates vary, marine biotechnology is a multi-billion dollar industry and an industry in growth.[5] At the same time, investments in new knowledge and new commercial applications do not come cheaply. Even such initial steps as collecting

[1] Appeltans, et al. *World Register of Marine Species* [online database], 2011. <www.marinespecies.org>.
[2] Ausubel, *First Census of Marine Life: Highlights of a Decade of History*, 2010, p. 12.
[3] Ibid., pp. 12-16.
[4] Ibid., p. 3.
[5] According to the Marine Board of the European Science Foundation, the global market for marine biotechnology products and processes is estimated at € 2.8 billion for 2010, see Querellou, et al., *Marine Biotechnology: A New Vision and Strategy for Europe*, 2010. See p. 9.

biological material may cost tens of thousand of dollars each day.[6] Chances of successfully developing a product from an identified compound are slim.[7] Consequently, bioprospecting in the high seas and the great depths are typically conducted by well-funded research institutions and industry, often in consortia, from developed countries.

Simultaneously, regimes for sharing the benefits which arise from genetic resources from areas under national jurisdiction are developing, in particular under the Convention on Biological Diversity (CBD)[8] and its Nagoya Protocol.[9] Stakeholders in developing countries, largely left out of the marine bioprospecting game, are calling for similar approaches to the areas beyond the limits of national jurisdiction. Regulating who may bioprospect and who should "bio-prosper" is a question of reconciling different views on conditions for innovation and global distribution of wealth, while safeguarding the conservation and sustainable use of the marine biodiversity.

The main international treaty governing the marine areas beyond national jurisdiction is the United Nations Convention on the Law of the Sea (UNCLOS).[10] It was praised in 1982, at the final session of the Third United Nations Conference on the Law of the Sea, as a "comprehensive constitution for the oceans which will stand the test of time".[11] For all its acclaim, UNCLOS was not negotiated with modern biotechnology in mind. The living resources of the high seas are principally dealt with in Section 2 of Part VII, but the primary focus is on fishing activities and the conservation of marine mammals. Part XI on the Area elaborately regulates prospecting for mineral resources, but not for biological

[6] See e.g. Hayes, "Charismatic Microfauna: Marine Genetic Resources and the Law of the Sea", 2007, p. 686; Greiber, *Access and Benefit Sharing in Relation to Marine Genetic Resources from Areas Beyond National Jurisdiction: A Possible Way Foreward*, 2011.

[7] See Vierros, et al., *An Update on Marine Genetic Resources: Scientific Research, Commercial Uses and a Database on Marine Bioprospecting*, 2007, paragraph 4.

[8] *Convention on Biological Diversity* [CBD], United Nations, 5 June 1992, 1760 UNTS 79.

[9] *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity* [NP], United Nations, 29 October 2010.

[10] *United Nations Convention on the Law of the Sea* [UNCLOS], United Nations, 10 December 1982, 1833 UNTS 3.

[11] The statement was made the Tommy B. Koh, president of the Third Conference, see United Nations General Assembly, *A Constitution for the Oceans*, 1982.

ones.[12] The rights to the inventions emerging from bioprospecting are governed by domestic laws subject to a set of international minimum standards and instruments of harmonisation. However, the laws on intellectual property are minimally concerned with the origin of the biological material in question.

No instrument of public international law specifically addresses marine bioprospecting in the high seas. It is therefore of interest to determine the legal grounds[13] and conditions according to which bioprospecting in the high seas can be conducted. Moreover, given that the issue is currently being discussed among policymakers, it is worth considering alternatives to the current situation. In light of these issues, the aim of this thesis is two-fold: it seeks to explore the applicable law and practical legal issues encountered by bioprospectors in the high seas. Second, it aims to outline regulatory scenarios, with a specific view of providing concrete alternatives that address the question of access and benefit-sharing.

In order to answer these questions it is imperative to firstly examine *de lege lata* relevant international law. This will be done with a view to establishing the legal framework that applies to both the activity of bioprospecting and the biological material as an *in situ* natural resource. Subsequently, ongoing debates and approaches to bioprospecting regulation and access within several international fora will be explored. These findings will be used as a basis for outlining options *de lege ferenda* for access to biological material in and from the high seas and the possible sharing of benefits.

As the reader will discover, several legal questions relating to bioprospecting in the high seas cannot be met with universally accepted answers. The many possible answers also leave room for creativity for those seeking alternatives to the current situation.

[12] See UNCLOS, article 133 on the definition of "resources".
[13] Legal grounds in this thesis means the positive law warranting or permitting a given action or sanction.

1.2. Methodology and relevant sources of law

The two research tasks indicated above represent different ways from which the main question of bioprospecting in the high seas may be addressed. To a certain extent, they require different methodological approaches. The methods employed when studying on-going discussions and outlining new policies will be elaborated upon at the start of the respective chapters.

This thesis follows the methodology of public international law and relies on the sources of law found in article 38 of the Statute of the International Court of Justice.[14] Several convention texts are discussed in the following. UNCLOS will receive most attention, as this is the most comprehensive global treaty governing high seas activities. The Convention is ratified by 162 states and is deemed to establish the "legal framework within which all activities in the oceans and seas must be carried out".[15] Attention is also paid to the 1958 High Seas Convention[16] and the Convention on the Continental Shelf[17] to further shed light on the law of the sea. Regional agreements are also relevant in that they offer perspectives and approaches to high seas regulation. The WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement)[18] helps clarify bioprospectors' obligations in light of both the law of the sea and the current framework for intellectual property rights. Moreover, conventions such as the CBD, the FAO International Treaty on Plant Genetic Resources for Food and Agriculture[19] and conventions under the Antarctic Treaty System present other fora in which bioprospecting or access and benefit-sharing are discussed.

[14] *Statute of the International Court of Justice* [ICJ Statute], United Nations, 26 June 1945, article 38(a) and (b).
[15] United Nations General Assembly, *Oceans and the Law of the Sea*, 2011 (A/RES/66/77), preamble, paragraph 4.
[16] *Convention on the High Seas* [Convention on the High Seas], United Nations, 29 April 1958, 450 UNTS 11.
[17] *Convention on the Continental Shelf* [Convention on the Continental Shelf], United Nations, 29 April 1958, 499 UNTS 311.
[18] *Agreement on Trade-Related Aspects of Intellectual Property Rights* [TRIPS Agreement], WTO, 15 April 1994.
[19] *International Treaty on Plant Genetic Resources for Food and Agriculture* [ITPGRFA], Food and Agriculture Organization of the United Nations, 3 November 2001, 2400 UNTS 303.

When establishing the content of treaty provisions, the method employed will be that set forth in the Vienna Convention on the Law of Treaties[20] Section 3. If an interpretation in good faith of the ordinary meaning of the terms leaves the meaning ambiguous or obscure, the *travaux préparatoires*, as reflected in commentary works, and the circumstances of its conclusion are used to assist interpretation.[21] It should be noted that for the case of UNCLOS, party submissions during the negotiations are not available in an official compilation and are generally not considered as endorsed by the parties.[22] The UNCLOS text is authenticated in six different languages, which are all equally authoritative.[23] This thesis relies on the English text.

Though there are many legal questions that arise in relation to bioprospecting in the high seas, disputes have yet to hit open courts. As a consequence, judicial decisions do not constitute an important source of law in the discussions. Scholarly teachings and publications, on the other hand, offer possible indications of international customary law and expressions of opinion concerning current legal framework and future regulatory options. Scholarly literature in fields such as biology, economy and political science are used to supplement discussions.

1.3. Key terminology

In order to examine the legal issues at stake, certain key terms require explanation and clarification. This section clarifies how key terms are generally understood and how they are used in this thesis.

1.3.1. Bioprospecting

Biological prospecting, or bioprospecting, is neither defined nor referred to in UNCLOS or the CBD. This is itself noteworthy, since these conventions determine important rights and

[20] *Vienna Convention on the Law of Treaties* [VCLT], United Nations, 23 May 1969, 1155 UNTS 331.
[21] Ibid., article 32.
[22] Wegelein, *Marine Scientific Research: The Operation and Status of Research Vessels and Other Platforms in International Law*, 2005, p. 2.
[23] VCLT, article 33.

obligations that fall upon states and their nationals who conduct marine or terrestrial bioprospecting. The treaty texts of greatest relevance to establishing these rights and obligations offer little guidance on the ordinary meaning of bioprospecting or the context in which the term appears. It is therefore necessary to examine whether custom or state practice indicates a common or ordinary meaning of the term.

Domestic legislation of several states refers to biological prospecting. By looking at definitions given under different domestic laws, Arico and Salpin point to different understandings of the reach of bioprospecting beyond the actual search on site.[24] They propose a synthesis of several definitions and suggest that bioprospecting may contain elements such as, firstly, "systematic search, collection, gathering or sampling of biological resources for purposes of commercial or industrial exploitation"; secondly "screening, isolation, characterization of commercially useful compounds"; thirdly "testing and trials"; and lastly "further application and development of the isolated compounds for commercial purposes, including large-scale collection, development of mass culture techniques, and conduct of trials for approval for commercial sale".[25] By contrast to this broadly encompassing approach, some legislation surveyed sees bioprospecting as only the first of these four stages. This suggests an absence of widespread consensus among states as to a definition of bioprospecting. The survey also shows that definitions are quite recent.[26] From this, it can be concluded that a common understanding has yet to develop and that there probably is no clear definition to be found in international customary law.

Understandings of the term also vary with respect to which *objective* bioprospecting pursues. The most pressing question here is whether bioprospecting exclusively covers commercial research, or whether research with a purely taxonomical or other fundamental scientific objectives can be said to be bioprospecting. The use of the term by various international organisations allows exploration of this question. For example, in an

[24] Arico and Salpin, *Bioprospecting of Genetic Resources in the Deep Seabed: Scientific, Legal and Policy Aspects*, 2005, p. 15.
[25] Ibid.
[26] None of the legislation studied by Arico and Salpin dates back further than the year 2000. This does not preclude the possibility that older definitions are found in other domestic legislations.

information paper presented by the CBD secretariat bioprospecting is defined as "the exploration of biodiversity for commercially valuable genetic and biochemical resources" and "the process of gathering information from the biosphere on the molecular composition of genetic resources for the development of new commercial products".[27] This would mean that biodiversity exploration performed with purely scientific objectives would not constitute bioprospecting.

A definition proposed by the UN Secretary-General is somewhat wider. He refers to bioprospecting as a term "generally understood, among researchers, as the search for biological compounds of actual or potential value to various applications, in particular commercial applications".[28] It follows from this definition that prospecting is an *active* enterprise. Secondly, this activity has a particular *objective*. This is not necessarily or only the objective of encountering specific species, but includes finding of compounds that have at the very least *potentially* valuable applications. Such a wide perception of which compounds may be isolated and identified is highly relevant: it is in the very nature of a search that the object and potential uses be unknown to the bioprospector prior to a first sampling. Moreover, the scope of application of a compound may evolve with scientific developments. Lastly, this definition alludes to bioprospecting as a predominantly commercial enterprise, without excluding the possibility that scientists may conduct bioprospecting without any prior commercial objective. For these reasons, such a wide understanding of the term will be held in this thesis.

Sometimes the bioprospecting is referred to as comprising the securing of intellectual property rights (IPR) to commercial applications.[29] As establishing IPR is no necessary consequence of bioprospecting, this is not how the term will be understood in this thesis.

[27] COP5, *Progress Report on the Implementation of the Programmes of Work on the Biological Diversity of Inland Water Ecosystems, Marine and Coastal Biodiveristy and Forest Biodiversity*, CBD, 2000 (UNEP/CBD/COP/5/INF/7), paragraph 6.

[28] United Nations Secretary-General, *Oceans and the Law of the Sea: Report of the Secretary-General*, 2007 (A/62/66), paragraph 105.

[29] See e.g. The Research Council of Norway, *Possibilites for a Bioprospecting Commitment in Norway 2008-2020*, 2007, p. 7, defining bioprospecting as covering "commercial purpose research and development, building on use of natural occurring compounds, all the way from first discovery, over patenting, benchmarking, improvement, development and commercialization."

Nevertheless, the relationship between bioprospecting and patent law has to be taken into account and will be discussed as needed in the following.

Marine bioprospecting can be conducted from either floating or sub-marine vessels or even from land or immobile installations such as artificial islands. In the context of high seas bioprospecting, only the first two options are practicable today. Whether the activity takes place from a floating or a submerged vessel does not in itself affect the legal provisions applicable to the activity.

Bioprospecting can lead to a vast array of applications and the scientific methods employed to reach this end can also vary. Here, biotechnology is the field of applied biology of focus. In the CBD biotechnology means "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use".[30] This is a broad definition. No specific limitation of field of technology is intended here by the reference to biotechnology.

1.3.2. High seas

The geographical scope of this thesis is the high seas. UNCLOS establishes different jurisdictional zones for the sea. The zone in which an activity takes place defines the rights and obligations of parties to UNCLOS. Article 86 provides that the high seas are all parts of the seas that are beyond internal waters and territorial seas of a coastal state and beyond archipelagic waters of an archipelagic state. Where states have made claim to an exclusive economic zone (EEZ) in accordance with Part V, i.e. maximum two hundred nautical miles "from the baselines from which the breadth of the territorial sea is measured",[31] the high seas are the part of the sea beyond this zone.

A second delimitation must also be made downwards, towards the ocean floor. Here, the high seas must be distinguished from the Area and the continental shelf, where the latter

[30] CBD, article 2, paragraph 4.
[31] UNCLOS, articles 86 and 57.

extends beyond the EEZ. The continental shelf is the natural prolongation of the land territory of a coastal state, extending at a maximum to 200 nautical miles from the baselines and excluding the deep ocean floor.[32] Beyond lies the Area, defined as "the sea-bed and ocean floor and subsoil thereof beyond the limits of national jurisdiction".[33] Both the Area and the continental shelf are governed by legal regimes distinct from that of the high seas. These are not the main object of this thesis, but they will be discussed with a view to resolving certain practical issues that may arise for bioprospecting taking place in waters bordering the high seas and the seabed.

The high seas and the Area are often referred to as areas beyond national jurisdiction (ABNJ). As a label, the term ABNJ might be somewhat misleading,[34] since states may regulate the activity of natural and legal persons who are nationals of that state, according to the nationality principle. Though flag state jurisdiction opens up for a range of possible legal frameworks applicable to bioprospecting depending on domestic legislation, the focus of the thesis is the international law applicable to the high seas.

1.3.3. Access and benefit-sharing

The terminology of access and benefit-sharing (ABS) comes from the CBD, but is since also encountered in other settings of international law. The CBD contains references to ABS, but it is not defined.

One ordinary meaning of the noun "access" is that of having the "means or opportunity to enter a place".[35] Applied to this setting, the word captures the possibility to physically retrieve biological material. Furthermore, access can be understood as a "right or opportunity to use or benefit from something".[36] This underscores that access can mean the legal possibility to utilise something. The question of access for bioprospecting in the high

[32] Ibid., article 76.
[33] Ibid., article 1(1)(1).
[34] Barnes, "Entitlement to Marine Living Resources", 2010, p. 83.
[35] *Oxford Dictionary of English*, 2010, sub verbo "access".
[36] Ibid.

seas is therefore a question of establishing the legal grounds and conditions for entering the high seas with a view to use biological resources in bioprospecting.

The noun "benefit" has several different significations, one of which is that of an "advantage […] gained from something".[37] As such, it is something deemed of positive value. Sharing a benefit involves some sort of transfer of this from one person or party to another. The nature of a benefit is neutral; it can be tangible or not, and monetary or not. An illustration of the multitude of forms that benefits may take can be found in the non-binding Bonn Guidelines to the CBD.[38] Proposed forms of monetary benefits to providing parties include e.g. access fees, up-front payments, research funding and even co-ownership of IPR. The variety of non-monetary benefits proposed in the guidelines is even greater, including the sharing of research results, admittance to *ex situ* facilities, capacity building and even social recognition. Given the range of ways benefits can be shared, the notion of benefit-sharing varies by context. Such a range raises an issue that will be addressed in this thesis, namely if any of these forms of benefit-sharing are currently present within the UNCLOS framework, and which could be appropriate to suggest for alternative models for high seas ABS relating to bioprospecting.

1.3.4. Biological material

"Biological material" is not found in UNCLOS. In this thesis the term means the resource used in the activity of bioprospecting. It is any biological material, including genetic, biochemical or any other biotic component of ecosystems.

By discussing biological material, this thesis adopts a wider perception of the object of search than that encountered in certain other treaty texts. The CBD regulates access to genetic resources[39] (GR), seen as "genetic material of actual or potential value".[40] Genetic

[37] *Oxford Dictionary of English*, 2010, sub verbo "benefit".
[38] COP6, *Decision VI/24: Part A. Bonn Guidelines on Access to Genetic Resources and Fair and Equitable Sharing of the Benefits Arizing out of their Utilization*, CBD, 2002, appendix II, articles 1 and 2.
[39] CBD, article 15.
[40] Ibid., article 2, paragraph 11.

material is in turn defined as “any material of plant, microbial or other origin containing functional units of heredity”.[41] Genetic material is a subcategory of biological material. The choice of terminology in the CBD on GR has been met with criticism, as the meaning can be ambiguous.[42] It has for instance been subject to debate whether GR comprises biochemical material. Given this uncertainty and the fact that UNCLOS makes no reference to GR, there seems to be few convincing reasons to transpose this terminology to an UNCLOS setting.

The definitions used in international discussions on ABS regarding ABNJ are not always consistent in this matter. Sometimes reference is to GR or genetic material, while reference at other times is to biological material more broadly construed.[43]

A wider conception makes it possible to reduce complex problems of delimitation of what falls within and without the scope of GR.[44] Another advantage of adopting a broader definition is that of obtaining a greater degree of resistance to technological advances outdating discussions and regulations. More technologically neutral terms will therefore lay the grounds for discussions that hopefully are more resilient to the tolls of time.

It should be added, however, that the objective of ABS is to provide for a sharing of benefits that arise out of certain types of activities and use of natural resources. Therefore the reasoning behind and objectives for ABS are the same independently of whether the objects are genetic or, more generally, biological resources.

Identifying and studying these resources is generally perceived as holding great potential for a wide range of applications. According to a study of patent claims relating to marine

[41] Ibid., article 2, paragraph 10.
[42] See Dutfield, "Sharing the Benefits of Biodiversity: Is there a Role for the Patent System?", 2002, p. 901. See also Schei and Tvedt, *"Genetic Resources" in the CBD: The Wording, the Past, the Present and the Future*, 2010, pp. 8-9; Nijar, *The Nagoya Protocol on Access and Benefit Sharing of Genetic Resources: An Analysis*, 2011, pp. 21-24.
[43] See Schei and Tvedt, *"Genetic Resources" in the CBD*, 2010, p. 15.
[44] One example is the long-standing discussions in a CBD context of whether derivatives were to be considered as genetic materials or not, see e.g. Young and Tvedt, *Balancing Building Blocks of a Functional ABS System*, 2009, p. 24.

GR the most important fields of application are pharmacology and human health, agriculture and aquaculture, food and cosmetics, while emerging uses are found in the fields of ecotoxicology, bioremediation and biofuel production.[45]

1.4. Scope

The issue of bioprospecting in the high seas touches upon a wide range of legal questions, only some of which will receive close attention here. This thesis inquires into the law applicable to and regulatory alternatives for bioprospecting in the high seas. As such, the regime of the Area and the biological resources of the Area are not the primary objects of study. However, sedentary species in general are thought to have great potential for bioprospecting.[46] Genetic resources in the Area have also been subjects of a considerable body of scholarly literature, perhaps more so than those in the high seas.[47] In this thesis, the relationship between resource regulation of the Area and of the high seas will be examined.[48] Yet, it is not the goal here to provide an in-depth analysis of neither the common heritage regime, nor the law applicable to the biological resources of the Area.

As established, bioprospecting is closely related to the commercialisation of a product and the securing of exclusive rights. This thesis examines some of the questions regarding the relationship between the law of the sea and intellectual property law. Yet, no ambition is held to provide a complete analysis of IPR questions that arise in relation to bioprospecting and the patenting of living organisms from the sea.

Also, the use of high seas living resources is closely related to environmental law. Environmental obligations under UNCLOS receive the most attention, with some attention

[45] Arrieta, et al., *What Lies Underneath: Conserving the Oceans' Genetic Resources*, 2010, p. 18320. The study refers to marine genetic resources in general and does not refer to specific jurisdictional zones. See also Farrier and Tucker, "Access to Marine Bioresources: Hitching the Conservation Cart to the Bioprospecting Horse", 2001, p. 215.
[46] Arico and Salpin, *Bioprospecting of Genetic Resources in the Deep Seabed*, 2005, p. 30.
[47] See e.g. Glowka, "The Deepest of Ironies: Genetic Resources, Marine Scientific Research, and the Area", 1996; Leary, *International Law and the Genetic Resources of the Deep Sea*, 2007.
[48] See below, section 2.2.4.

also paid to other treaty obligations such as under CBD and the Antarctic Treaty System. Yet, international environmental law has developed both since the adoption of UNCLOS and independently of the law of the sea. Many of the general principles of environmental law have developed through the adoption of soft law instruments or regional agreements. Principles have emerged from declarations and action plans made *inter alia* at the 1972 Stockholm Conference on Human Environment[49] and the 1992 United Nations Conference on Environment and Development.[50] As Warner highlights, the detailed provisions in these and similar instruments tend to apply to areas within national jurisdiction.[51] For this reason and their possible non-binding nature,[52] these principles are not awarded close attention for the examination of current law applicable to bioprospecting.

[49] United Nations Conference on the Human Environment, *Report of the United Nations Conference on Human Development*, 1972 (A/CONF.48/14/Rev1).

[50] The Conference resulted in the adoption of the Rio Declaration and Agenda 21 which dedicates chapter 21 to oceans, see respectively UNCED, *Report of the United Nations Conference on Environment and Development: Rio Declaration on Environment and Development*, 1992 (A/CONF.151/26, vol. I, Annex I); UNCED, *Report of the United Nations Conference on Environment and Development: Chapter 17*, 1992 (A/CONF.151/26, vol. II).

[51] Warner, *Protecting the Oceans Beyond National Jurisdiction: Strengthening the International Law Framework*, 2009, p. 67.

[52] See Birnie, "Law of the Sea and Ocean Resources: Implications for Marine Scientific Research", 1995, pp. 229-232.

2. Current legal framework for bioprospecting in the high seas

The aim of this chapter is to identify the current law applicable to bioprospecting in the high seas. This is done, first, by adopting an activity-based perspective and asking how the activity of bioprospecting is regulated under UNCLOS and other sources of law. More specifically, this is a question of determining the legal basis for lawfully conducting the activity. It is also a question of examining the applicable conditions that follow from each legal basis. Second, a resource perspective will be assumed with a view to identifying the law relating to the natural resources used in bioprospecting and to determine their legal status.

Admittedly, the law of the sea does not distinguish activity from resource: just as provisions on fishing cannot be completely separated from the regulation of fish as a natural resource and vice versa, the law applicable to bioprospecting as an activity must also be seen in relation to the law applicable to the biological resources used. Yet adopting these two perspectives separately offers a methodological platform from which the question can be addressed from different angles. Put together, these two perspectives will form an answer to the question of the current law applicable to bioprospecting in the high seas.

2.1. Current framework for bioprospecting as an activity

The freedom of the high seas is a fundamental governing principle of international law, recognised in customary law,[53] the Convention on the High Seas[54] and in UNCLOS. Part VII of UNCLOS, entitled "High seas", states that the high seas are "open to all States",[55] which reflects equality of use as an important trait relative to the principle. The enjoyment of this freedom is thus not reserved for coastal states or states parties to UNCLOS. If viewed as a freedom of the high seas, bioprospecting is an activity open to all, subject to certain conditions laid down in the law of the sea. A central task is therefore to discuss the relationship between the freedoms of the high seas and bioprospecting.

[53] See e.g. *The case of the S.S. "Lotus"*, P.C.I.J. Series A, No. 10, Permanent Court of International Justice, 7 september 1927, p. 25.
[54] Convention on the High Seas, article 2.
[55] UNCLOS, article 87(1)(a), (e) and (f).

Article 87 of UNCLOS lists positively several activities that constitute such freedoms, including "freedom of navigation", "freedom of fishing" and "freedom of scientific research".[56] Although bioprospecting is not unequivocally included among the permitted activities, it may not be concluded without further consideration whether bioprospecting is covered by any of the listed activities. A first task is therefore to examine the relationship between the listed free activities and bioprospecting. The list is however non-exhaustive, as indicated by the use of the terms "inter alia". If bioprospecting is not covered by the listed freedoms, this calls for further examination of customary law.

2.1.1. Freedom of the high seas: bioprospecting as navigation and fishing

The freedom of navigation is further treated in article 90, entitled "Right to navigation". It awards all states the "right to sail ships flying its flag" in the high seas. An ordinary understanding of the term "navigation" is that of planning and directing "the course of a ship […] or other form of transport" or to "sail or travel over a stretch of water".[57] Similarly, the right to sail would ordinarily refer to a right to "travel by ship on or across a sea".[58] Hence, the element of marine transport is the central feature of the freedom of navigation. Other activities carried out during transport in the high seas may be open to all, but not on the legal basis of the freedom of navigation. Marine bioprospecting requires navigation as a prerequisite for venturing the area in question. Ships in the high seas are under the exclusive jurisdiction of the flag state,[59] with which the vessel must have a "genuine link".[60]

[56] Other freedoms listed in article 87, such as the right of overflight, the right to lay submarine cables and the right to construct artificial islands will not be further discussed.
[57] *The Concise Oxford English Dictionary*, 2010, sub verbo "navigate".
[58] *Oxford Dictionary of English*, 2010, sub verbo "sail".
[59] UNCLOS, article 92(1).
[60] Ibid., article 91(1). See also the High Seas Convention, article 5(1). On the question of the a "genuine link" and international treaties establishing further regulation of the right to navigate, see Churchill and Lowe, *The Law of the Sea*, 1999, pp. 257-277.

Bioprospecting involves navigation, but reaches further by extending to a search for biological compounds of value for various applications. This search is an activity with a different objective than that of navigation and transport. This suggests that bioprospecting cannot be considered a form of navigation. A contextual interpretation could further shed light on the validity of this interpretation. In an EEZ, all states enjoy the right of navigation.[61] Yet, other activities such as exploring and exploiting the living resources of the waters in the EEZ are subject to the sovereign rights of the coastal state.[62] Marine scientific research activities are also subject to a coastal state's consent.[63] Bioprospecting, such as sampling of living resources, would accordingly not be considered as mere navigation, open to all, in the EEZ. A related argument may also be made with respect to the territorial sea. Ships cannot carry out marine scientific research in the territorial waters of another state while enjoying the right of innocent passage, because this activity renders the passage non-innocent.[64] The result would be the same for bioprospecting, irrespective of whether bioprospecting is labelled as marine scientific research. Though it cannot be firmly asserted that the term "navigation" necessarily has the same meaning in the high seas as in other zones, there are no indications in the treaty text to suggest that the term navigation is to be given a substantially wider interpretation for the high seas than for the EEZ. Hence, the ordinary meaning of the terms "navigation" and "bioprospecting", interpreted in their context, suggests that bioprospecting is not a freedom of the high seas solely by virtue of the element of navigation therein. Yet, because bioprospecting involves navigation, the general principles of flag state jurisdiction also apply to vessels performing bioprospecting.

The next question is whether bioprospecting can be considered to be a form of "fishing" and thus be open to all states. Fishing is not defined in the Convention, but one possible

[61] UNCLOS, article 59(1).
[62] Ibid., article 56(1)(a).
[63] Ibid., article 246.
[64] Ibid., article 40. See Pavliha and Gutiérrez, "Marine Scientific Research and the 1982 United Nations Convention on the Law of the Sea", 2010, p. 121.

understanding could be that of "harvesting fish for commercial uses".[65] Bioprospecting also involves harvesting living marine material. The scope of the harvested objects is not identical as bioprospectors harvest a greater range of marine species than merely fish, e.g. cold-blooded vertebrate animals with gills and fins.[66] On the other hand, there are examples in international law of quite broad definitions of what is considered as fish. For instance, non-sedentary molluscs and crustaceans are defined as fish in the UN Straddling Fish Stocks Agreement.[67] It is not customary, however, to speak of "fishing for microorganisms". Bacteria in deep waters are collected in a way that is not generally regarded as "harvesting".[68] It can be concluded that the ordinary meaning of the terms "fishing" and "bioprospecting" differ.

Yet, the objectives pursued by both activities have certain common denominators. The greatest is the use of living resources for predominately commercial purposes. High seas fishing aims at catching large quantities of a given living resource to produce the maximum yield from those species.[69] Generally, the objective is to catch and subsequently sell the fish for human consumption, animal feed or related products.[70] Bioprospecting does not aim at harvesting large quantities for subsequent sale of the raw material, but at identifying material with scientifically or commercially interesting properties that will initiate subsequent process of development. Human or animal consumption is only one of many possible applications. The nuances of the respective objectives pursued are also apparent when considering the methods employed. Fishing methods such as pole and line, purse seine, gill netting, trawling and stunning[71] are not excluded as methods of bioprospecting,

[65] *World Encyclopedia*, 2008, sub verbo "fishing". The harvest can also be for leisurely uses, but this is less practical in the high seas.
[66] *The Oxford English Dictionary*, 2008, sub verbo "fish".
[67] *Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks* [Straddling Fish Stocks Agreement], United Nations, 4 August 1995, 2167 UNTS 3, article 1(a).
[68] Leary, "Bioprospecting and the Genetic Resources of Hydrothermal Vents on the High Seas: What is the Existing Legal Position, Where Are We Headed and What Are Our Options?", 2004, p. 150.
[69] Scovazzi, "Is the UN Convention on the Law of the Sea the Legal Framework for All Activities in the Sea? The Case of Bioprospecting", 2010.
[70] See Churchill and Lowe, *The Law of the Sea*, 1999, p. 281.
[71] See *World Encyclopedia*, 2008, sub verbo "fishing".

but are certainly less commonplace for sampling activities. Accordingly, apart from general objectives of harvest for commercial purposes, there are important differences of objectives and methods concerning these two activities.

The freedom of fishing in the high seas is in UNCLOS article 87 subjected to the conditions of Section 2 of Part VII, entitled "Conservation and management of the living resources of the high seas". The section comprises the articles 116 to 120. Articles 117 to 120, concerning the conservation of living resources in the high seas, apply generally to high seas activities and are not restricted to fishing. Hence, bioprospecting is subject to these conditions.[72] An overlap of the conditions applicable to the activities could in itself be an argument for considering bioprospecting as a form of fishing. Article 116 concerns fishing and stipulates that the right to engage in high seas fishing is subject to the "treaty obligations" of the states whose nationals engage in fishing. These treaty obligations will evidently vary from one flag state to another. They may be concluded under the auspices of a regional fisheries management organisation (RFMO). They may be area-specific regional agreements or species-specific agreements that address conservation or attempt to prevent the problem of over-exploitation of high seas fish stocks.[73] No such fisheries agreement is known that addresses the question of bioprospecting. This may suggest that the usually quite different ecological impact[74] of the two activities call for different regulatory approaches.

These variations of objective, method and impact support the point of view that the freedom of fishing cannot be transposed to bioprospecting without straining the concepts beyond their usual limits.

Though there is no certain answer to the question of whether analogies from fishing may be used to establish bioprospecting as a high seas freedom, the reasons against doing so appear

[72] The material content set forth in these provisions will be further discussed below, see section 2.2.2.
[73] On some of these agreements, see Churchill and Lowe, *The Law of the Sea*, 1999, pp. 296-323.
[74] See below, section 2.2.2.

to be the most compelling. It remains to consider whether bioprospecting has more in common with scientific research.

2.1.2. Freedom of the high seas: scientific research

Whether bioprospecting is scientific research depends on the definitions retained of both bioprospecting and scientific research. This section explores these concepts and their possible overlap. It also elaborates on the practical legal implications of considering bioprospecting as marine scientific research.

2.1.2.1. Scientific research, marine scientific research and bioprospecting

"Scientific research" is not defined in UNCLOS. This is also the case for a closely related term, namely marine scientific research (MSR).[75] An ordinary understanding of the research is that of a "systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions".[76] Moreover, a research could be said to be scientific when "based on or characterized by methods and principles of science".[77] Although the Convention scarcely refers to "scientific research"[78] without the adjective "marine", MSR is quite extensively regulated, notably in Part XIII entitled "Marine Scientific Research". A possible explanation for this is that different committees negotiated parts VI and XIII of the Convention.[79] It is not specified in the Convention whether or not these two concepts are to be considered as synonymous.

First of all, a purely lexical interpretation indicates that scientific research is a broader and more general term than MSR. Studies of the atmosphere, for example, that are undertaken

[75] On yet a related term, "hydrographic survey", see UNCLOS, article 21(1)(g) and Wegelein, *Marine Scientific Research*, 2005, pp. 80-82.
[76] *Oxford Dictionary of English*, 2010, sub verbo "research".
[77] *Oxford Dictionary of English*, 2010, sub verbo "scientific".
[78] Apart from article 87, "scientific research" is only referred to six times in the convention text and always in relation to scientific research installations or equipment, scientific research programmes or scientific research policies, see articles 123, 200, 249 258, 260 and 261.
[79] Nordquist, *United Nations Convention on the Law of the Sea, 1982: A Commentary. Articles 192 to 278*, 1991, p. 432.

from a research vessel in the high seas could be considered to be scientific research and accordingly a high seas freedom, without necessarily being classified as MSR, since the marine environment is not the object of the research.[80] This suggests that the two concepts indeed have different meanings. On the other hand, the enjoyment of the freedom of scientific research as set forth in article 87 is "subject to Parts VI and XIII" which underscores a close relationship between scientific research and MSR.[81] Part VI on the continental shelf awards coastal states the sovereign rights to the natural resources of the continental shelf[82] and limits the extent to which scientific research can be done on the continental shelf.[83] More important in this context is the reference to Part XIII: if the scientific research is considered "marine", the legal regime set forth in Part XIII applies. Scientific research can generally be regarded as "marine" when directly concerned with the marine environment.[84] Regarding marine bioprospecting, the activity is directly concerned with biological material in the marine environment. Accordingly, if bioprospecting were considered scientific research it follows that bioprospecting would also constitute MSR. It is therefore the definition of MSR that will be sought in the following.

As the term is generally understood, MSR opens up research in a wide range of disciplines, such as biology, biotechnology, geology, chemistry, physics, geophysics, hydrography and oceanography.[85] It includes research conducted with a variety of research objectives. As noted by Churchill and Lowe, scientific knowledge is a precondition for rational exploitation of oceanic resources and for safer navigation.[86] MSR also provides humanity with a greater understanding of the Earth, and has historically prompted the understanding that the planets' outer layer consists of moving plates.[87] The question is whether MSR also includes bioprospecting, i.e. the search for biological compounds of value to various

[80] See Andenæs, *Norsk havforskningsjurisdiksjon*, 2009, pp. 28-30.
[81] UNCLOS, article 87(1)(f).
[82] Ibid., article 77(1).
[83] See below, section 2.2.3.
[84] Wegelein, *Marine Scientific Research*, 2005, p. 78.
[85] Pavliha and Gutiérrez, "Marine Scientific Research and the 1982 United Nations Convention on the Law of the Sea", 2010, p. 115.
[86] Churchill and Lowe, *The Law of the Sea*, 1999, p. 400.
[87] Ibid.

applications, in particular commercial applications. This requires a further examination of the legislative history of MSR.

A strong contributing factor to the lack of definition of MSR in the Convention was the disagreement among parties as to the necessity of a distinction between fundamental, pure or basic scientific research, on the one side, and commercially oriented or applied research on the other.[88] This disagreement persists today among parties to UNCLOS.[89] Marine scientific research was not included in the non-exhaustive list of freedoms in the 1958 Convention on the High Seas, but has been considered as such in virtue of customary law for several decades prior to the adoption of UNCLOS.[90] In the 1958 Convention on the Continental Shelf, a distinction between pure and applied scientific research was introduced relating to research on the continental shelf: a coastal state should not normally withhold consent for research conducted with "a view to pure scientific research into the physical or biological characteristics of the continental shelf".[91]

The question of a possible distinction between fundamental and applied sciences arose again leading up to and during the Third Conference on the Law of the Sea. Whereas the Convention on the Continental Shelf regulated the relationship between the sovereign rights to the resources of the coastal state and the rights of third parties to MSR on the continental shelf, the task at hand had now grown in complexity. The perceptions of MSR were greatly affected by the expansion of coastal state jurisdiction, the growing awareness of the value of marine science and the emergence of new notions such as the seabed beyond national jurisdiction as the "common heritage of mankind".[92] In 1972, a proposal submitted by Canada to Sub-Committee III of the Sea-Bed Committee cast MSR as "any study, whether fundamental or applied, intended to increase the knowledge about the

[88] See Nordquist, *United Nations Convention on the Law of the Sea, 1982: A Commentary. Articles 192 to 278*, 1991, p. 434-450.
[89] Beslier, "The Protection and Sustainable Exploitation of Genetic Resources of the High Seas from the European Union's Perpective", 2009, p. 339.
[90] Churchill and Lowe, *The Law of the Sea*, 1999, p. 401.
[91] Convention on the Continental Shelf, article 5(8).
[92] Nordquist, *United Nations Convention on the Law of the Sea, 1982: A Commentary. Articles 192 to 278*, 1991, p. 432.

marine environment, including all its resources and living organisms, and embraces all related scientific activity".[93] This constitutes a broad definition, but still requires a scientific intent. Four Eastern European states made a somewhat similar proposal the following year: scientific research "in the world ocean" would be

> any fundamental or applied research and related experimental work […] which does not aim directly at industrial exploitation but is designed to obtain knowledge of all aspects of the natural processes and phenomena occurring in ocean space, on the sea-bed and subsoil thereof […].[94]

Such a proposal, read with modern MSR in mind, would appear to include commercially oriented research insofar as industrial exploitation is not the primary aim of the research. Critics argued that a line should be drawn between industrial research, offering immediate possibilities for utilisation for economic purposes, and basic scientific research, carried out for the benefit of the community "without concern for profit" and yielding "data which were accessible to all, were not of a secret nature, and were public property".[95] On the basis of these and other proposals, a working group formulated MSR as "any systematic investigation, excluding industrial exploration and other activities aimed at the direct exploitation of marine resources, designed to increase mankind's scientific knowledge of the marine environment".[96] While several states were prepared to accept this definition provided that MSR was recognised as a basis for industrial and commercial advantage, other parties argued that a definition was superfluous, as the meaning of the terms would indirectly be established in the substantive articles.[97] In light of the current disagreement on MSR, the argument against not providing a definition is not very convincing. In 1975, draft proposals submitted would again support the effort to defining MSR broadly, while introducing a distinction of pure and applied research only in relation to MSR conducted on the continental shelf and in the EEZ.[98] Later, even the broad definitions were dropped. The difficulties parties to UNCLOS had in agreeing upon a definition illustrate that the

[93] Ibid., p. 441.
[94] Ibid. The term "world oceans" was phrased as to exclude the continental shelf.
[95] United Nations Division for Ocean Affairs and the Law of the Sea (Office of Legal Affairs), *Marine Scientific Research: A Revised Guide to the Implementation of the Relevant Provisions of the United Nations Convention on the Law of the Sea*, 2010, p. 5.
[96] Nordquist, *United Nations Convention on the Law of the Sea, 1982: A Commentary. Articles 192 to 278*, 1991, p. 442.
[97] Ibid.
[98] Ibid.

understanding of the term may vary both according to the perceptions of the different states and according to jurisdictional zones.

From this look at the legislative history, two main positions can be discerned. The first is that MSR includes commercially oriented research such as bioprospecting. The second is that research for commercial purposes is resource-exploitation and not MSR. Conclusive views on whether bioprospecting is a mere sub-category to MSR or whether it is a distinct activity are premature in the current situation. Yet, there are compelling arguments for both positions.

A convincing argument to support the position that commercially oriented research in the high seas is indeed MSR is the wording chosen in article 87 and Part XIII. States did not expressly submit to MSR in the high seas as excluding commercially oriented research. This argument goes both ways, though, as states did not either expressly consent to an inclusion of commercially oriented research as MSR. Yet the important point to make here is that a distinction between fundamental and applied research was proposed and rejected. The only explicit regulation of *purpose* for MSR applicable to the high seas is that it shall be conducted exclusively for peaceful purposes.[99] In the absence of a codified distinction between pure and applied sciences for MSR in the high seas, it is the ordinary meaning of the term MSR that parties have to fall back on. As seen above, MSR can be said to be a systematic investigation related to the marine environment based on methods and principles of science. Bioprospecting indubitably contains elements of scientific research, such as systematic search, collection, gathering or sampling of marine resources based on methods of science. The composition of persons and the equipment used may also be the same for the two activities, e.g. in taxonomical studies and bioprospecting cruises. Furthermore, it may be argued that a commercial objective for the expedition does not eliminate a simultaneous objective of increasing human knowledge of the oceans.

[99] UNCLOS, article 240(a).

The position that MSR excludes commercially-oriented bioprospecting finds support through a contextual interpretation. Though the Convention does not employ terms such as fundamental or applied research for MSR, such a distinction is *de facto* introduced with respect to EEZ and on the continental shelf.[100] Here, states have the discretion to withhold consent to third party MSR, where the project is of "direct significance for the exploration and exploitation" of their natural resources.[101] These are projects that may be reasonably expected to produce results enabling resources to be located and assessed with respect to their availability for commercial exploitation.[102] If however, these projects are carried out "in order to increase scientific knowledge on the marine environment for the benefit of all mankind" consent must normally be granted.[103] Similarly, the regime of the Area distinguishes between MSR, which all states may undertake for the benefit of mankind,[104] and other activities such as "prospecting"[105] or "exploration and exploitation"[106] which are subject to the control of the International Seabed Authority, which acts on behalf of mankind. The fact that this distinction was introduced for other zones, could suggest that MSR also excludes commercially oriented scientific research in the high seas. Considerations on the effective implementation of the objectives of MSR, i.e. the promotion of the "study of the marine environment",[107] could call for a similar understanding of the term in all jurisdictional zones, including the high seas.

For the case that MSR in the high seas is to exclude commercially oriented research, a line must be drawn between purely scientific and commercial research. For bioprospecting, there would have to be a parameter for establishing when a cruise is conducted for purely scientific purposes and when it crosses the "line of commercialisation" and becomes

[100] See Churchill and Lowe, *The Law of the Sea*, 1999, p. 405.
[101] UNCLOS, article 246(5)(a). See Wolfrum and Matz, "The Interplay of the United Nations Convention on the Law of the Sea and the Convention on Biological Diversity", 2000, p. 458, who argue that states may withhold consent to bioprospecting in the EEZ.
[102] United Nations Division for Ocean Affairs and the Law of the Sea (Office of Legal Affairs), *Marine Scientific Research: A Revised Guide*, 2010, p. 10.
[103] UNCLOS, article 246(3).
[104] Ibid., e.g. articles 256 and 143.
[105] Ibid., article 16(2)(f)(ii) and Annex III, article 2.
[106] Ibid., e.g. articles 1(1)(3), 137 and 153.
[107] Ibid., preamble, paragraph 5.

something else. Of some indication here could be a statement made by the UN Secretary-General:

> In most cases, genetic resources are collected and analyzed as part of scientific research projects, in the context of partnerships between scientific institutions and industry. It is only at a later stage that knowledge, information and useful materials extracted from such resources enter a commercial stage. The difference between scientific research and bioprospecting therefore seems to lie in the use of knowledge and results of such activities, rather than the practical nature of the activities themselves.[108]

According to this view the line can be drawn after the end of a cruise. Yet, if the concern is to establish the rights and obligations of bioprospectors while at sea, the distinction must be drawn at an earlier stage. Generally, attempts at such earlier distinction are drawn the on the basis of the intent of researchers.[109] Applying a characteristic such as intent that is typical of natural persons onto legal persons can be problematic.[110] In this context, it would mean establishing the presence of commercial intent of a consortium or an institution, though different teams or individuals within the larger cruise staff or administration may have different intents and objectives for the cruise. Where there is a difference of intent, it would be necessary to determine which intent is to prevail. Furthermore, if intent should determine conditions for access, it would have to be presupposed that such intent exists prior to conducting the activity and does not evolve afterwards, which may not be the case. This would exclude fundamental research activities that only later result in the identification of commercial application and serendipitous encounters of commercially interesting biological features. Clearly establishing a commercial or non-commercial intent is not an easy task. Despite criticism, a distinction based on intent has gained some traction.[111]

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[108] United Nations Secretary-General, *Oceans and the Law of the Sea: Report of the Secretary-General*, 2005 (A/60/63/Add.1), paragraph 202.

[109] See e.g. Subsidiary Body on Scientific, *Study on the Relationship between the Convention on Biological Diversity and the United Nations Convention on the Law of the Sea with Regard to the Conservation and Sustainable Use of Genetic Resources on the Deep Seabed*, Convention on Biological Diversity, 2003 (UNEP/CBD/SBSTTA/8/INF/3/Rev.1), paragraph 47.

[110] Wegelein, *Marine Scientific Research*, 2005, p. 83, who argues that the problems of establishing intent should result in interpreting MSR as comprising both pure and commercial research. See also Hayes, "Charismatic Microfauna", 2007, p. 692.

[111] Broggiato, "Marine Genetic Resources Beyond National Jurisdiction – Coordination and Harmonisation of Governance Regimes", 2011, p. 37.

For the case that bioprospecting is a sub-category of MSR, the question is what conditions apply to the conduct of this activity. UNCLOS establishes general principles for conduct of MSR. A first principle is that MSR shall be conducted exclusively for peaceful purposes.[112] This is in accordance with the general rule applicable to all activities in the high seas found in article 88. Also, MSR shall not unjustifiably interfere "with other legitimate uses of the sea".[113] Concerning ABNJ, this principle bears on the equal access of all states to the high seas. A further general principle states that MSR shall be conducted in "compliance with all relevant regulations adopted in conformity with this Convention including those for the protection and preservation of the marine environment".[114] This principle can in turn be seen in relation to the last principle, namely that MSR shall be conducted "with appropriate scientific methods and means" compatible with UNCLOS.[115] This refers to standards within the scientific community. A regional and noteworthy approach to these standards is offered by the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR).[116] A code of conduct for marine research is applicable to the parts of the OSPAR area that are outside national jurisdiction. Researching vessels sailing the flag of a party to OSPAR should, when working in areas of particular ecological vulnerability, take "utmost care […] not to disturb or damage the features as far as possible".[117] Only the most environmentally friendly methods should be used: sampling tools should match site-characteristic features and be minimally intrusive in the sensitive or protected areas and underwater noise should be restricted to a minimum".[118] The guidelines go on to state that researchers should "ensure that transport of biota between different marine regions that could lead to changes in the marine environment […] does not occur"[119] and that the number of samples should be "reduced to the necessary minimum".[120] The guidelines are

[112] UNCLOS, article 240(a). For a discussion of MSR for military purposes, see Wegelein, *Marine Scientific Research*, 2005, pp. 94-99.
[113] UNCLOS, article 240(c).
[114] Ibid., article 240(d).
[115] Ibid., article 240(b).
[116] *Convention for the Protection of the Marine Environment of the North-East Atlantic* [OSPAR], 22 September 1992, 2354 UNTS 67.
[117] OSPAR, *OSPAR Code of Conduct for Responsible Marine Research in the Deep Seas and High Seas of the OSPAR Maritime Area*, 2008 (Agreement 2008-01), paragraph 14.
[118] Ibid., paragraph 19(a) and (c).
[119] Ibid., paragraph 20.
[120] Ibid., paragraph 21.

of a non-binding nature, and OSPAR Convention itself is only binding upon parties, but this still provides an example of what certain states consider appropriate scientific methods.

In addition to the four general principles for MSR, UNCLOS establishes concrete rights and duties. Analysing the relationship between these rights and duties and bioprospecting is the task set forth for the next three sections. For the case that bioprospecting is a form of MSR, the question is one of determining which conditions apply to bioprospecting. It is important to note that the consequences discussed below may in themselves constitute arguments for or against considering bioprospecting as a form of MSR.

2.1.2.2. Bioprospecting as MSR: patenting bio-inventions

Where bioprospecting leads to a new commercial application, exclusive intellectual property rights are often established in order to protect the invention. UNCLOS is not generally seen as an instrument of IPR. Securing such rights happen not at sea but rather on the land territory of one or several states. The practical question that arises is if and how the rights and obligations under UNCLOS influence the possibility of seeking exclusive rights to biotech inventions under other legal instruments. For the sake of a meaningful discussion, a brief survey of the intellectual property law applicable to inventions from bioprospecting is now necessary.

Patents are the form of IPR relevant to bioprospecting.[121] The general rationale behind awarding patents is one of providing an incentive to innovate and thus a benefit to society.[122] The granting of patent protection is an act performed by national authorities according to domestic and regional laws.[123] Where the application is filed or granted determines the applicable jurisdiction. However, at a global level, the WTO TRIPS Agreement sets minimum requirements for domestic legislations. These minimum

[121] Other forms of intellectual property rights such as copyrights, trademarks or industrial designs will not be discussed in the following.
[122] See e.g. Westerlund, *Biotech Patents: Equivalency and Exclusions under European and US Patent Law*, 2001, pp.12-18.
[123] See e.g. *European Patent Convention* [EPC], 5 October 1973.

requirements involve no specific regulation of material from ABNJ. Patent law is not concerned with the provenance of the biological material used to develop the invention.[124]

A patent provides the holder, the patentee, with an exclusive right to an invention for a limited period in time. Where bioprospecting has led to the invention of a product, the patentee may exclude others from making, using, offering for sale, selling, and importing for these purposes the product.[125] Where the invention is a process, the patentee may prevent others from using, offering for sale, selling, or "importing for these purposes at least the product obtained directly by that process".[126] The Agreement requires members to make patents available for "products and processes, in all fields of technology" meeting three basic requirements. The invention must be deemed new, involve an inventive step and be capable of industrial application.[127] The overarching rule in patent law provides that inventions and not discoveries are eligible to patenting. The line between these concepts can be hard to draw concerning biotechnological inventions. There is no universal definition of what is considered an invention, but it can be considered as a new product or process with no previous existence.[128] Yet many substances that are isolated from naturally occurring substances found in nature are being patented, often without substantial changes.[129] Such isolated or purified subject matter must generally speaking meet two requirements to qualify as inventions: it must not exist freely *per se* in nature and its function must be determined.[130] There is a great deal of controversy surrounding the debate patentability of naturally occurring substances, which need not be addressed here.[131]

[124] Tvedt, "Patent Law and Bioprospecting in Antarctica", 2010, p. 49. See TRIPS Agreement, article 27(1).
[125] TRIPS Agreement, article 28(1)(a).
[126] Ibid., article 28(1)(b).
[127] Ibid., article 27(1).
[128] Westerlund, *Biotech Patents*, 2001, p. 32.
[129] Ibid., p. 57.
[130] Ibid., p. 59.
[131] For a review of current legal solutions to this, see Temmerman, *Intellectual Property and Biodiversity: Rights to Animal Genetic Resources*, 2012, pp. 48-68.

The Agreement leaves member states a narrow margin of appreciation for making exemptions to patentability.[132] Exception can be made for "plants and animals other than micro-organisms" and "essentially biological processes for the production plants and animals other than non-biological and microbiological processes". [133] Accordingly, microorganisms must be patentable provided they meet the basic requirements. Dutfield argues that this must also be the case for genetic and biochemical resources, since they are not expressly excluded.[134] This will also depend on an interpretation of the terms "plants and animals".

By obtaining these rights, bioprospectors may recover costs of R&D through monopoly pricing, licence fees and royalty payments,[135] and potentially gain substantial revenues. Having set out these fundamentals of patenting and inventions involving high seas biological material, it is now time to examine the relationship of these rules and UNCLOS provisions relating to MSR.

2.1.2.3. Bioprospecting as MSR: publication of research results and patents

Publication of research results is a deeply rooted scientific tradition and is reflected in UNCLOS article 244 as an obligation to publish and disseminate information and knowledge that results from MSR. There are three reasons to examine the obligation to share research results in the context of the current inquiry: firstly, clarifying the obligation would offer a partial answer to the question of which obligations fall upon bioprospecting if considered a form of MSR. Secondly, this obligation may provide arguments for or against considering bioprospecting as a form of MSR. Lastly, the sharing of knowledge

[132] TRIPS Agreement, article 27(2)(3). The provision allows for exemptions to be made if this is necessary to protect *ordre public* and morality. On the very narrow field of application of these criteria, see Grubb, *Patents for Chemicals, Pharmaceuticals and Biotechnology: Fundamentals of Global Law, Practice and Strategy*, 1999, pp. 256-258.

[133] TRIPS Agreement, article 27(3)(b). This provision also opens for protection of plant varieties either by patents or through an effective *sui generis* system or a combination of these two options. This issue will not be treated here.

[134] Dutfield, "Sharing the Benefits of Biodiversity", 2002, p. 903.

[135] Salpin and Germani, "Patenting of Research Results Related to Genetic Resources from Areas Beyond National Jurisdiction: The Crossroads of the Law of the Sea and Intellectual Property Law", 2007, p. 18.

may constitute a form of benefit-sharing.[136] If this obligation falls upon the activity of bioprospecting, it should operate as a foundation for later discussions on regulatory options for ABS in the high seas.

A first task is to establish what UNCLOS requires to be published and how publication must occur. According to article 244, states and competent international organisations shall make available "by publication and dissemination through appropriate channels information on proposed major programmes, their objectives as well as *knowledge* resulting from marine scientific research".[137] To this end, states shall "actively promote the flow of scientific data and information", both alone and in co-operation with other states and international organisations.[138] As a general limitation applicable to all activities under UNCLOS, states are not required to disclose information which is "contrary to the essential interests" of the state.[139]

"Knowledge resulting from marine scientific research" indicates that conclusions and findings that are a consequence of the MSR activity are what is to be shared. In bioprospecting the title to research results is likely to be regulated by contracts or understandings among the participants and funding parties. Where universities participate, it must also be added to the equation the increasing tendency of western universities to seek patent protection and become technology owners.[140] University intellectual property policies may regulate and limit the freedom to disseminate results.[141] Industry contracts may also stipulate terms for the publication of results or even exclude it altogether.[142] The duty to make the information available articulated in article 244 is placed upon states and competent international organisations, whereas nationals are not specifically mentioned.

[136] See e.g. Matz-Lück, "The Concept of the Common Heritage of Mankind", 2010, p. 70.
[137] UNCLOS, article 244(1). [emphasis added]
[138] Ibid., article 244(2). The clause also provides for the transfer of technology resulting from MSR. Technology transfer will be discussed below, see section 2.1.2.3.
[139] Ibid., article 302.
[140] De Larena, "The Price of Progress: Are Universities Adding to the Cost?", 2007.
[141] Gorina-Ysern, *An International Regime for Marine Scientific Research*, 2003, pp. 387-396.
[142] Salpin and Germani, "Patenting of Research Results Related to Genetic Resources from Areas beyond National Jurisdiction", 2007, p. 22. See also Gorina-Ysern, *An International Regime for Marine Scientific Research*, 2003, pp. 396-399.

This may have the practical implication that only where states hold title to the research results would there be an obligation to make the knowledge public.[143] If research is conducted by private entities and national legislation does not provide for similar dissemination obligations falling upon private subjects, the result would be that only parts of the total marine research would be made public. This seems to run counter to the objective of the provision, namely the general dissemination of MSR research. Another possible interpretation is that article 244 obliges or at the very least encourages states to "actively promote" the dissemination of knowledge from MSR irrespective of whether it is the state itself or its nationals that hold the title to the research results.

Article 244 sets forth an obligation to make MSR knowledge "available by publication and dissemination". An ordinary understanding of these terms may suggest that an active effort of publication is required. Merely answering questions as to research results if another state were to ask could appear insufficient. "Appropriate channels" may suggest publication in scientific journals, making the results public online or, as Salpin and Germani suggest, through diplomatic channels.[144] If this latter mode of publication is seen as sufficient, it could in turn indicate that publication upon demand from another state could satisfy the requirements of article 244. Common modes of publishing research results are through regional scientific communities, such as the International Council for the Exploration of Sea, [145] or global entities, such as the World Meteorological Organization, the Intergovernmental Oceanographic Commission and the International Hydrographic Organization.[146]

A separate yet related question arises where bioprospecting has led to a patented invention. The patent system balances the exclusivity obtained by a patent claim with publication.

[143] Salpin and Germarni argue that the obligation to publish is more likely to be complied with where the research is publicly funded, see Salpin and Germani, "Patenting of Research Results Related to Genetic Resources from Areas beyond National Jurisdiction", 2007, p. 22.
[144] Ibid., p. 23.
[145] See *Convention for the International Council for the Exploration of the Sea* [ICES Convention], 12 September 1964.
[146] Andenæs, *Norsk havforskningsjurisdiksjon*, 2009, pp. 45-46.

This is often referred to as the *quid pro quo* of patent law.[147] Previous publication bars further patentability in identical form. Publication in patent law takes the form of a disclosure of the invention.[148] The justification for requiring patentees to disclose the invention can be explained by the blocking effect on other inventions: it notifies third parties of the invention and its scope, and explains the application of the invention.[149] The TRIPS Agreement article 29(1) requires that parties make applicants disclose inventions "in a manner sufficiently clear and complete for the invention to be carried out by a person skilled in the art".[150] Generally in patent law, these descriptions are written descriptions. A question that can be raised is whether written disclosures on inventions from bioprospecting in the high seas satisfy the requirements of UNCLOS article 244 of making the knowledge available through appropriate channels. A complete answer to this question requires an empirical analysis of such disclosures, a task that goes beyond the scope of this thesis.

However, considering a few general features patent disclosure is informative. Firstly, the inventions are publicly disclosed and are likely to contain descriptions at a very high technical level and sometimes formulated by patent lawyers. The UNCLOS requirement is not detailed with regards to how the research must be presented. Probably, one may not read into article 244 a pedagogical requirement of this information being comprehensible to anyone but the persons skilled in the art. Secondly, the general disclosure is likely to omit references as to where the biological material originated, unless domestic regulation requires this. This is the controversial question of disclosure of origin, which has arisen as a result of CBD obligations. Schematically, it opposes the views of developing and developed states.[151] Though certain domestic intellectual property statutes require a

[147] Tvedt, "Patent Law and Bioprospecting in Antarctica", 2010, p. 51.
[148] The issue of disclosure of an invention must not be mistaken for the controversial question of disclosure of origin of biological material or traditional knowledge. These are separate concepts, which bear similar denominations.
[149] See Westerlund, *Biotech Patents*, 2001, pp. 77-79.
[150] See similarly EPC, article 83. The somewhat different requirement in the United States is of a description of an invention to be in such full, clear, and exact terms as to enable any skilled person in the art to make and use the invention, see Westerlund, *Biotech Patents*, 2001, p. 81.
[151] See e.g. *Directive on The Legal Protection of Biotchnological Inventions* [Directive 98/44/EC], The European Parliament and the Council, 6 July 1998, 1998/44/EC and its quite loosely formulated article 27.

disclosure of origin, the support is far from universal and no proposals to amend the TRIPS Agreement have so far been successful.[152] Currently, then, a written disclosure need not state that the biological material is collected in the high seas.

In relation to article 244, such an omission is of less importance since the provision applies generally to all zones of jurisdiction and does not require parties to specify the zone in which MSR was undertaken. A separate question is whether article 244 requires the publication of results to indicate to the reader that the knowledge is a result of MSR. On the one hand, according to a straightforward textual interpretation of the UNCLOS requirement to make MSR knowledge "available", there is no obligation to state that the research results from MSR, so long as the results are published. On the other hand, since an important objective is to the promote MSR there may be an obligation to disclose that the patent results from MSR. After all, states do have the general obligations to "promote and facilitate the development and conduct of marine scientific research"[153] and to "integrate the efforts of scientists in studying […] the marine environment".[154] Such responsibilities could speak to there being an obligation to indicate that the knowledge results from MSR. The answer to this question should probably also depend on how scientists assess the added value of knowing that the information results from MSR.

Concerning marine bioprospecting, written disclosures are not the sole relevant form of disclosure. Several states have accepted the deposit of microorganisms as a supplement or replacement to the written description. Such deposit is regulated, *inter alia*, by the Budapest Treaty on International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure.[155] This treaty seeks to overcome the difficulty of "repeatability" of microorganisms in patent procedures and the viability of culture

[152] See Straus, "How to Break the Deadlock Preventing a Fair and Rational Use of Biodiversity", 2008.
[153] UNCLOS, article 239.
[154] Ibid., article 243.
[155] *Budapest Treaty on the International Recognition of the Deposit of Microorganism for the Purposes of Patent Procedure* [Budapest Treaty], WIPO, 28 April 1977. As of May 2012 there are 75 contracting parties.

collections.[156] Access to the deposit for third parties is not regulated in the treaty, but the treaty regulations specify that a principle of secrecy to information on deposited organism applies, stating that no depository authority shall give "information to anyone whether a microorganism has been deposited", nor shall it give "information to anyone concerning any microorganism".[157] The Budapest Treaty does not prevent patentees from deciding to make descriptions of inventions available to others, but they have no such obligation. The disclosure of an invention is therefore more limited under the Budapest Treaty than under the general patent law, as third party access to the disclosure may be replaced with deposits that third parties may not have access to. Subsequently, it can be concluded that the rule under the Budapest Treaty does not provide for publication and dissemination of MSR results "through appropriate channels".[158] Though domestic regulations may provide for an effective implementation of UNCLOS article 244, this task can be rendered difficult as a result of the principle of secrecy practiced under the Budapest Treaty system.

Provided that contractual obligations or IPR policies do not prevent publishing results from MSR, there is no time frame set in article 244 for the publishing or dissemination of research results. Awaiting the approval of a patent application before publishing seems therefore not to pose problems.[159]

To sum up, contractual obligations and patents may prevent swift publication of research on marine biological material. Depending on case-specific circumstances, compliance with UNCLOS article 244 may be altogether excluded. There are two alternative conclusions that can be drawn from this: on the one hand, the position can be held that MSR is the legal basis for bioprospecting as a high seas freedom, but that intellectual property legislation currently prevents the effective implementation of the obligations to publish research

[156] Gorina-Ysern, *An International Regime for Marine Scientific Research*, 2003, p. 415.
[157] Tvedt, "Patent Law and Bioprospecting in Antarctica", 2010, p. 51, citing *Regulations Under the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purpose of Patent Procedures* [Budapest Treaty Regulations], WIPO, 28 April 1977, rules 9.2 and 11.
[158] See Tvedt, "Patent Law and Bioprospecting in Antarctica", 2010, making the point that the patent system runs counter to publication requirements under the Antarctic Treaty.
[159] This may be different for research undertaken in the Area, where dissemination of research results and analysis shall be made "when available". See UNCLOS, article 143(3)(c).

results. This would mean there is an implementation gap concerning existing benefit-sharing mechanisms applicable to bioprospecting as MSR. On the other hand, the implementation gap can be seen as an argument against considering bioprospecting as a form of MSR: it can be stated that since the patent procedures following bioprospecting work against important obligations under the MSR regime, the reasons for considering this activity as part of MSR are less compelling.

2.1.2.4. Bioprospecting as MSR: MSR as a basis for patent claims

Pursuant to article 241, marine scientific research activities "shall not constitute the legal basis for *any claim* to any part of the marine environment or *its resources*".[160] For the case in which bioprospecting is considered to be MSR, the question is whether this provision prevents states and their nationals from seeking or granting patents based on inventions from high seas biological material. As will be shown, this is a controversial question.

The term "any claim" is broad. A claim can mean a "demand for a remedy or assertion of a right".[161] The inclusion of the word "any" would suggest that a broad meaning is intended, and that both public and private claims are comprised therein.[162] A patent claim is a legal proprietary title whose validity is sanctioned by a public authority and which is enforceable in relation to other natural and legal persons. A patent claim would according to the ordinary meaning of the term constitute a claim.[163]

The term "marine environment" is equally broad. Article 241 is placed under Section 1 of Part XIII, entitled "[g]eneral provisions", and therefore applies generally to MSR untaken in all parts of the ocean, including the high seas. A possible interpretation could be that since no exception is made to the effect, the marine environment of the seabed would also

[160] [emphasis added]
[161] *A Dictionary of Law*, 2009, sub verbo "claim".
[162] Whether a patent claim should be classified as private or public is debatable. For the purposes of the issue discussed here, no such classification is necessary, as both private and public claims are comprised in the broad "any claim" according to the ordinary meaning of the term.
[163] See Gorina-Ysern, *Legal Issues Raised by Profitable Biotechnology Development Through Marine Scientific Research*, 2003. She considers that IPR constitute a claim in relation to article 241.

be included in "the marine environment". The "resources" of the marine environment would, according to a natural understanding of the term, comprise both living and non-living resources of the marine environment, both macroorganisms and microorganisms. Claims to the mineral resources of the Area follow the provisions under Part XI. Concerning the biological resources of the seabed in ABNJ, it can be argued that they are also resources of the marine environment in relation to this provision. As the narrow definition of "resources" in the Area as mineral resources applies only to Part XI[164] a possible interpretation is that article 241 also applies to the MSR conducted on the seabed in ABNJ. Regarding the resources of the high seas, there is little room for diverging options. The biological resources in the high seas are resources of the marine environment.

It is "marine scientific research activities" that cannot lawfully constitute a "legal basis" for a claim. It can be argued that the marine scientific research activities are not the *basis* for a patent claim itself: what obtains exclusivity through the claim is not the marine resource sampled by MSR activities, but rather the subsequent intellectual endeavour taking place in mainland laboratories and testing facilities.[165] To this it may be interjected that the MSR activities are a prerequisite for the mainland activities. A possible yet highly controversial position is that the close link between MSR and subsequent intellectual endeavours is an argument that should lead to considering MSR as the legal basis for patent claims.

The wording in article 241 is open to two opposite interpretations. It is therefore necessary to further examine state practice and the context in which the article was adopted. The draft proposals, as received by Sub-committee III of the Sea-Bed Committee, vary with regards to what kind of claims MSR could not lead to and which areas of sea the provision would apply to.[166] As there is little doubt that the final text applies to ABNJ, it is the nature of the

[164] UNCLOS, article 133 states that "For the purposes of this part […] "resources" means […] mineral resources".

[165] Wegelein argues along this line, stating that "acquired data of any scientific research do not necessarily qualify as intellectual property as they only represent facts, the conclusions drawn from them are […] copyrighted material. […] The individual achievement of the scientist must be distinguished from the raw data". Wegelein, *Marine Scientific Research*, 2005, p. 119.

[166] Nordquist, *United Nations Convention on the Law of the Sea, 1982: A Commentary. Articles 192 to 278*, 1991, p. 464.

claims which are excluded for this zone that is of most interest here. The initial proposal, submitted by Canada, stated that MSR "as such shall not form the legal basis for any claims of exploitation rights or any other rights in areas beyond the limits of national jurisdiction".[167] Another proposal by Malta stated that scientific research "shall not constitute a legal basis for any jurisdictional claims with regard to ocean space or its resources".[168] The further negotiations resulted in two proposals in 1973. One reflects the Canadian proposal and the other is broader and reflects the later text of article 241, though containing the words (marine scientific research activities) "as such". In 1974, a further draft proposed that MSR activities should not "form the legal basis for any claim whatsoever to any part of the marine environment or its resources". Subsequently, the term "whatsoever" was excluded, and "shall not form" was replaced with "shall not constitute".[169]

Through this examination of preparatory works, one may not conclude as to whether the authors of this part of the Convention intended to regulate patenting claims resulting from MSR. As modern biotechnology was in its infancy, it would appear that the issue of patenting and MSR were not discussed or were not a main concern. What may be concluded from the negotiations, however, was that parties deliberately adopted a wide understanding of the term "claim", including both jurisdictional claims and claims of exclusive exploration and exploitation of the resources of another state.[170] Wegelein argues that article 241 could not have been intended to exclude IPR, as scientific research "would become meaningless from the standpoint of scientific activity"[171] and that scientists want their findings associated with their names. This argument is based on a presumption that IPR are the main, or even the only, incentive to conduct MSR. This cannot be entirely true, considering the value of the "study" of the marine environment recognised in UNCLOS[172]

[167] Ibid.
[168] Ibid.
[169] Ibid., p. 465.
[170] Gorina-Ysern, *An International Regime for Marine Scientific Research*, 2003, p. 363.
[171] Wegelein, *Marine Scientific Research*, 2005, p. 119.
[172] UNCLOS, preamble, paragraph 5.

and the many expeditions undertaken to further human understanding of the oceans and marine life.

Importantly, there are no indications of state practice since the adoption of the Convention to support an interpretation of article 241 as excluding patenting of inventions that result from MSR.[173] This does not however eliminate the possibility that an evolutionary interpretation may lead to an understanding of the provision that is more in line with what the ordinary meaning of the terms could suggest. On the other hand, such an interpretation risks running counter to state obligations under patent law. UNCLOS provides that the Convention "shall not alter the rights and obligations of State Parties" arising under other agreements which are compatible with UNCLOS and "which do not affect the enjoyment by other State Parties of their rights or the performance of their obligations under this Convention".[174] UNCLOS and the TRIPS Agreement are compatible as long as compliance with the TRIPS Agreement does not affect the exercise by a state of its obligations under UNCLOS.[175] Accordingly, it is not likely that an understanding of article 241 preventing patents from high seas MSR can develop without substantial changes in patent law. This would, for instance, require a change of the current legal situation where patent law is not concerned with the provenance of the material and a resolution of the question of disclosure of origin.

To sum up these discussions on bioprospecting and MSR, it can be stated that there are compelling arguments for considering MSR as the legal ground for bioprospecting as a high seas freedom. For those bioprospecting cruises that are conducted without commercial intent and that do not result in subsequent commercial applications, there is no reason to consider the activity as anything but MSR. For those cruises that are conducted with commercial intent or result in commercial application, the answer is less certain. The wording in Part XIII does not indicate that parties intended to exclude commercial

[173] See e.g. Gorina-Ysern, *An International Regime for Marine Scientific Research*, 2003, p. 364.
[174] UNCLOS, article 311, paragraph 2. The TRIPS Agreement does not contain a similar provision.
[175] Salpin and Germani, "Patenting of Research Results Related to Genetic Resources from Areas beyond National Jurisdiction", 2007, p. 20.

research. Yet, some of the more concrete MSR obligations seem not to fit very well with the practices of exclusivity and secrecy in bioprospecting. This can be interpreted as an implementation deficit of Part XIII. Alternatively, this seeming discrepancy can be seen as an argument against considering MSR as the legal grounds for lawful bioprospecting. Taking this position does not mean that bioprospecting is not permitted under the law of the sea. The next section examines what the legal basis for bioprospecting then may be.

2.1.3. A freedom *sui generis*

Article 87, as previously stated, does not provide an exhaustive list of freedoms of the high seas. For the case where one does not retain the view that bioprospecting is either a form of fishing or MSR, the question still remains of whether bioprospecting is a distinct form of high seas freedom. If so, the conditions applicable to this freedom must be established.

2.1.3.1. Analogies and norms of the law of the sea

A first remark is that the activity of bioprospecting bears resemblance to permitted high seas activities. It can therefore be argued that analogies from such listed freedoms may have the consequence that bioprospecting is considered a freedom of the high seas. The harvesting of marine living resources is open to all, subject to environmental obligations found in Section 2 of Part VII. Marine scientific research is at the very least sanctioned for basic scientific research. Bioprospecting does entail using methods closely resembling traditional MSR, yet with a divergent objective. Still, a commercial intent or objective is not itself a persuasive argument for dismissing the activity as a high seas freedom: exploiting the living resources for commercial gain is clearly an instance of such freedom exerted when engaging in high seas fisheries.

Perhaps more important than the analogies that may be drawn from the listed freedoms, is the absence of norms in international law ruling out bioprospecting as a freedom of the high seas. Broggiato explains how during the 20 years of exploitation of marine GR in ABNJ through sampling, there have not been allegations in the diplomatic debate that this

practice is unlawful.[176] The absence of objections to the legality of this activity is a strong argument for considering bioprospecting as a freedom of the high seas. State practice appears consistent in this respect and of a duration that is as long as the history of marine bioprospecting in ABNJ.[177] There is accordingly little doubt that bioprospecting is a permitted use of the high seas. A more difficult question that arises is that of the principles under which bioprospecting can take place in the high seas.

2.1.3.2. Applicable conditions

For the case that bioprospecting is not considered as a high seas freedom by virtue of MSR, but on a separate basis, it can first be noted that the activity is subject to the general conditions applicable to all activities in the high seas. This means that bioprospecting may only be conducted for peaceful purposes.[178] As seen above, though bioprospecting is different from mere navigation, general provisions pertaining to flying the flag of a state are also applicable.[179] States must furthermore show "due regard for the interests of other States in their exercise of the freedom of the high seas".[180] What "due regard" entails is not further specified in the treaty text.[181] The obligation to show due regard for the interests of other states can be seen in relation to the general principle of cooperation between states. It can also be viewed as a duty to take into concern the rights accorded by the treaty to other states.

Another question is whether not considering bioprospecting as a sub-category to MSR means that all provisions relating to MSR lose all binding force upon states and their nationals who perform bioprospecting simply because a commercial application is

[176] Broggiato, "Marine Genetic Resources Beyond National Jurisdiction", 2011, p. 36. Her argument refers in particular to sampling in the deep seas of ABNJ. See also Leary, "International Law and the Genetic Resources of the Deep Sea", 2009, p. 362.
[177] On the elements of international custom, see Brownlie, *Principles of Public International Law*, 2003, pp. 6-12.
[178] UNCLOS, article 88.
[179] See above, section 2.1.1.
[180] UNCLOS, article 87(2).
[181] A similar expression, "reasonable regard", is found in UNCLOS, article 147 concerning the Area and in article 2 of the 1958 Convention on the High Seas.

developed at a later stage or a commercial intent can be established. It can be argued that because bioprospecting encompasses steps and procedures that are typical of, if not identical to, MSR activities, bioprospecting should be conducted in accordance with the general principles found in article 240. A first principle is that MSR shall be conducted exclusively for peaceful purposes.[182] This principle has its high seas counterpart in article 88, which applies to all activities. The next general principle is that MSR shall be conducted "with appropriate scientific methods and means" compatible with UNCLOS.[183] Even in the presence of a clear commercial intent, this intent does not eliminate the otherwise scientific procedures used in sampling activities. The general objective of the Convention to conserve oceanic resources[184] is an argument for applying this provision also to bioprospecting as a distinct high seas freedom. The same can be stated for achieving effective implementation of the objective of article 240.

As a further general principle, MSR shall be conducted in "compliance with all relevant regulations adopted in conformity with this Convention including those for the protection and preservation of the marine environment".[185] Section 2 of Part VII on the conservation and management of living resources applies to the activity of bioprospecting irrespective of whether the legal basis for the activity is MSR or something else. Whether other MSR relevant regulations would apply also to bioprospecting would depend on a further examination of that regulation.

Also as a general principle, MSR shall not "unjustifiably interfere with other legitimate uses of the sea" and it shall be "duly respected" in the course of such other uses.[186] A first remark is that bioprospecting is as an example of such a legitimate use of the high seas. When mutual respect is warranted for MSR and bioprospecting, there is less need to

[182] UNCLOS, article 240(a).
[183] Ibid., article 240(b).
[184] Ibid., preamble, paragraph 5.
[185] Ibid., article 240(d).
[186] Ibid., article 240(c).

discuss whether analogies should be drawn from this principle.[187] The qualifying term "unjustifiabl[e]" can suggest that some interference might occur, as long as it is not unlawful. This can be seen in relation with the general principle of fulfilling obligations in good faith and refraining from abuses of rights.[188] As pertains to the high seas, it can also be seen as an expression of the obligation to show "due regard for the interest of other states".[189]

A further question that can be raised is what the due respect that must be displayed for MSR means for the activity of bioprospecting. An example of a scenario where the question might arise is when bioprospecting has led to a patented gene sequence that is later sampled again by other persons through MSR. A possible way to see this situation is as one where bioprospecting blocks subsequent MSR, as the right to "make" or "use" a gene sequence or microorganism is now subject under patent law to the consent of the patentee.[190] What is considered an infringement of the rights of the patentee will invariably depend on an interpretation of the claim and the relevant patent law. The TRIPS Agreement opens up for domestic legislation to make exemptions to the scope of the exclusive rights conferred so long as exemptions do "not unreasonably conflict with the normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner".[191] Generally, research undertaken to understand a patented invention or to conduct experiments on the invention can be permitted.[192] A study undertaken by the Organisation of Economic Co-operation and Development shows that the extent of the exemptions offered in domestic legislations vary.[193] In relation to the subsequent MSR, this means that

[187] An interpretation of the words "unjustifiable" and "duly" may lead to the conclusion that the required mutual respect would entail that the exact same level of non-interference or respect is required.
[188] UNCLOS, article 300.
[189] Ibid., article 87(2).
[190] TRIPS Agreement, article 28(1)(a), for the case of a product. In theory, albeit less practical, the question can also arise as an infringement of the exclusive right to "import", where sufficient purification or change to the organism has happened during the cruise at high seas.
[191] Ibid., article 30.
[192] See e.g. Stenvik, *Patenters beskyttelsesomfang*, 2001, p. 120; Salpin and Germani, "Patenting of Research Results Related to Genetic Resources from Areas beyond National Jurisdiction", 2007, p. 21. See also the so-called Stockpiling Case concerning research exemptions in Canadian law, *Canada – Patent Protection of Pharmaceutical Products*, WT/DS114/R, WTO Dispute Settlement Panel, 17 March 2000.
[193] Dent, et al., *Research Use of Patented Knowledge*, OECD STI, 2006 (STI Working Paper 2), pp. 17-22.

how far the researching endeavour may go without infringement is determined by country-specific research exemptions or lack of such. At least in theory, subsequent research on sampled material can constitute an infringement where MSR leads researchers to synthetically reproduce a sequence that they have sampled but which is already patented. What's more, infringement may also occur where MSR researchers make or use a close derivative of the patented sequence if the patent covers this.

If MSR were blocked in some way, this blockage would not constitute "due respect" for (pure) MSR. Yet, even if this general principle of article 240(c) were implemented in the relevant domestic legislation, it would probably provide little resistance to the rights conferred by a valid patent claim in a civil case, especially since article 240 does not award rights to private parties. An interpretation by which these different instruments of international law can be harmonised is by simply considering MSR as stopping when the cruise is over and excluding subsequent research. Choosing this point for cessation in time of MSR would evidently not apply to all activities, as for example publication duties still await upon return. According to this line of interpretation, MSR rights such as access to high seas and the "due respect" through its course apply only while at sea, while obligations apply both during and after a cruise.

Concerning bioprospecting as something distinct from MSR, the issue of rights and obligations subsequent to the cruise can be raised. More particularly, the question is whether the MSR obligation to publish and disseminate results can be given normative value for the activity of bioprospecting. First of all, the effective implementation of article 240 and the objective of spreading knowledge among parties are arguments for considering that publication obligations also apply to bioprospecting. Yet, these are arguments based on the close resemblance of MSR and bioprospecting. If the firm position has been taken that bioprospecting is not MSR, the particularities of this activity have to be taken into consideration. A commercial intent or the subsequent commercial use of the biological material may require discretion in order to achieve the success being sought. Not surprisingly, there is no counterpart to article 244 found in Part VII that can support

publication as a general principle applicable to high seas activities.[194] Unlike the obligations to use appropriate scientific methods, which were stated above as probably also applying to bioprospecting, disseminating information on commercial applications does not have the same direct impact on the high seas environment. On the contrary, impact primarily lies in a greater range of inventions available. It would appear that there is no obligation to publish results to be drawn from the treaty text. The answer to this question may however depend on the value attributed to Part XIV, which concerns transfer of marine technology. This concept will be explored in the following section.

2.1.3.3 Transfer of technology

Part XIV, entitled "Development and Transfer of Marine Technology", is closely related to MSR and is usually discussed as a part of the MSR regime.[195] Yet the Convention does not make technology transfer obligations depend specifically on MSR. The provisions would therefore be as relevant for bioprospecting as for (pure) MSR. In this part, a redistributive principle is established. States have the general obligation, directly or through competent international organisations, to "cooperate in accordance with their capabilities to promote actively the development and transfer of marine science and marine technology" and to "endeavour to foster the economic and legal conditions for the transfer of marine technology for the benefit of all parties concerned on an equitable basis".[196] Equivalent principles can be found in the CBD[197] and the TRIPS Agreement,[198] though with various levels of specificity regarding party obligations.

As a result of the great resistance from developed states during the negotiations of UNCLOS, Part XIV of the Convention lacks specific obligations and has been described as

[194] But see UNCLOS, article 118. It concerns co-operation in the conservation of living resources. This issue will be discussed below. See section 2.2.2.
[195] See e.g. Churchill and Lowe, *The Law of the Sea*, 1999, p. 404.
[196] UNCLOS, article 266, paragraphs 1 and 3.
[197] CBD, article 16(2) provides that technology transfer to developing countries shall be facilitated. Where the technology is subject to IPR, transfer shall be "consistent with the adequate and effective protection of intellectual property rights." See Sands, *Principles of International Environmental Law*, 2003, p. 1045.
[198] TRIPS Agreement, article 66(2) provides that developed states "shall provide incentives" to their nationals to encourage technology transfer to the least developed member states.

a *pactum de contrahendo.*[199] The limited practical impact of the provisions on technology transfer can be illustrated by the fact that in promoting transfer, states shall have due regard to all legitimate interests, including the rights of holders and suppliers of marine technology.[200] Patents may be one such legitimate interest preventing transfer of marine technology from bioprospecting to developing states. Rights conferred by patents trump a state obligation to "endeavour to foster" technology transfer in case of a conflict. Several international organisations are engaged in promoting technology transfer.[201] On a bilateral level it is more difficult to establish the extent to which these general principles are being complied with. However, several parties to UNCLOS now consider Part XIV to be the part of the Convention with the gravest implementation gap.[202]

Yet irrespective of its limited practical impact, it should be highlighted that the principle of technology transfer envisages a transaction from those possessing benefits to those who only do so to a lesser degree. Accordingly, it is a form of benefit-sharing. In relation to later discussions below and the aim of this thesis to provide regulatory alternatives for high seas ABS, this observation is important. Part XIV shows that ABS is not a concept alien to the regime of the high seas, which may provide hope to ABS proponents. The lesson learned from Part XIV is also that for any ABS regime to be effectively implemented it must take patent law into account.

To sum up these discussions on the framework for bioprospecting through an activity perspective, recourse to regulation of activities as a legislative technique is widely present in the high seas regime. Yet UNCLOS remains a framework convention, and new types of marine activities pose challenges for the interpretation of the Convention. Despite the many substantial provisions applicable to high seas activities, firm answers to important questions cannot always be provided. The correct legal basis for conducting bioprospecting

[199] Churchill and Lowe, *The Law of the Sea*, 1999, p. 418.
[200] UNCLOS, article 267.
[201] United Nations Secretary-General, *Oceans and the Law of the Sea: Report of the Secretary-General*, 2011 (A/66/70), paragraphs 197-210.
[202] Ad Hoc Open-Ended Informal Working Group, *Letter Dated 30 June 2011 from the Co-Chairs of the Ad Hoc Open-Ended Informal Working Group to the President of the General Assembly*, United Nations General Assembly, 2011 (A/66/119), paragraph 36.

in the high seas is the most prominent of these questions. Adopting a resource perspective will complement these discussions and contribute to further understanding of the rights and obligations applicable to bioprospecting in the high seas.

2.2. Current framework applicable to the resources used in bioprospecting

Adopting a resource perspective is here understood as examining the law relevant to the biological resources used in bioprospecting. First, provisions regulating these resources in the high seas will be sought established. Subsequently, questions of bioprospecting in waters bordering other zones of jurisdiction will be discussed.

2.2.1. Status of marine biological material in the high seas

UNCLOS is strikingly silent when it comes to addressing the legal status of biological resources in the high seas. In comparison, the mineral resources of the Area are "common heritage of mankind".[203] The lack of corresponding declarations for the high seas has to be seen in relation to the general principle of the freedom of the high seas and the freedom of fishing.[204] The debate on use and appropriation of the seas goes back to the 17th century with the expansion of the horizon and the battle over *mare liberum* as opposed to *mare clausum.*[205] The former doctrine prevailed. Its most prominent ambassador, Hugo Grotius, argued that the sea is open as a *res communis*, and common things, like the air or the sea, cannot be occupied.[206] Today, the biological resources of the ocean are considered as common pool resources.[207] In the high seas, entitlement to the material may follow from harvest or other forms of exploitation. This is in contrast to the situation under the EEZ, where states may have exclusive or common property rights over resources.[208] Exploitation of fish in the high seas as a common pool resource has had a harmful effect on many fish

[203] UNCLOS, article 136.
[204] Ibid., article 87.
[205] See e.g Churchill and Lowe, *The Law of the Sea*, 1999, p. 204.
[206] Grotius and Vervliet, *Mare Liberum 1609-2009: Original Latin Text (Facsimile of the First Edition, 1609) and Modern English Translation*, 2009, pp. XV, 49-95.
[207] Barnes, "Entitlement to Marine Living Resources", 2010, p. 86, who discusses the potential of regulating activities in ABNJ through property rights-based entitlements.
[208] See Hannesson, *The Privatization of the Oceans*, 2004, pp. 51-56.

stocks, and can be described in the words of Garret Hardin as a tragedy of the commons.[209] Overexploitation is one of the reasons why the freedom of the high seas is not an absolute freedom. From a resource perspective, the conditions applicable to exploitation of marine living resources in the high seas are the most important limitations of this freedom.

2.2.2. Environmental standards applicable to marine biological material

Environmental standards applicable to marine living resources in the high seas are found in both Part XII and Section 2 of Part VII. To a certain extent, legislative emphasis is put on the protection of living resources, albeit primarily as obligations that follow from conducting an activity.

As a general principle applicable to all zones of jurisdiction, article 192 sets forth the obligation for states to "protect and preserve" the marine environment. States furthermore have the duty to take "all measures that are consistent with this Convention to prevent, reduce and control pollution of the marine environment".[210] "Pollution of the marine environment" is defined as the "introduction by man […] of substances or energy into the marine environment, which […] is likely to result in such deleterious effects as harm to living resources and marine life, […] and reduction of amenities".[211] On a general note, bioprospecting is no more likely to introduce harmful substances into the marine environment than navigation.[212] However, *in situ* prospecting in the deep sea could introduce alien elements such as light and noise.[213] This could be considered as an introduction of energy into the marine environment and thus constitute pollution. Yet

[209] Hardin, "The Tragedy of the Commons", 1968.
[210] UNCLOS, article 194(1).
[211] Ibid., article 1(1)(4).
[212] For an introduction to issues of shipping and the environmental regulation in UNCLOS, see Blanco-Bazán, "The Environmental UNCLOS and the Work of IMO in the Field of Prevention of Pollution from Vessels", 2003.
[213] Leary, "Bioprospecting and the Genetic Resources of Hydrothermal Vents on The High Seas", 2004, p. 167; Warner, *Protecting the Oceans Beyond National Jurisdiction: Strengthening the International Law Framework*, 2009, p. 20.

compared to other forms of marine pollution and the modest scale of current bioprospecting, the threat of pollution seems to be a marginal issue.[214]

UNCLOS provides environmental standards for the conservation of marine living resources. Section 2 of Part VII is particularly crafted for the conservation of fish stocks,[215] yet the scope of application for articles 117 to 119 is living resources in the high seas in general. Were bioprospecting, today or at later stage, found to trigger particular conservation measures under *inter alia* articles 192 or 117, taking such measures can be done either by states alone or in co-operation. The element of co-operation is specified in article 118 as a duty to co-operate regarding "conservation and management of marine resources in the areas of high seas" and, if nationals of several states operate in the same area, to negotiate on necessary measures.[216]

Article 117 charges states with a duty to take "such measures for their respective nationals as may be necessary for the conservation of living resources in the high seas".[217] The term "may be necessary" reflects a duty that is dynamic in the sense that what may not have been necessary when the Convention was adopted may be so today. Further guidance in the interpretation of what may be necessary is not offered by UNCLOS. Modern environmental principles, such as the application of "best scientific evidence available"[218] and the ecosystem approach,[219] are referred to. But the wording suggests that these enter the equation not when determining if measures are necessary, but as guiding principles for the modalities of these measures. Other environmental norms, such as the requirement to undertake environmental impact assessments for activities that have a significant adverse impact, may complement UNCLOS provisions as norms of customary law.[220]

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[214] See Ramirez-Llodra, et al., "Man and the Last Great Wilderness: Human Impact on the Deep Sea", 2011.
[215] See UNCLOS, article 116.
[216] Ibid., article 118.
[217] Ibid., article 117.
[218] Ibid., article 119(1)(a).
[219] Ibid., article 119(1)(b). The provision does not employ the expression "ecosystem approach, but speaks of species that are "associated with or dependent" on harvested species.
[220] This probably is the situation for nodule prospecting the Area, see *Advisory Opinion on Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area*, Case No.

This raises the question of whether bioprospecting triggers particular conservation obligations. While knowledge of the environmental impact of bioprospecting is still incomplete, bioprospecting is generally referred to as an activity of limited or minimal environmental impact. It can concern quite literally just a drop in the ocean. Again from a pragmatic point of view, bioprospecting is a significantly less destructive activity than others, such as overexploitation of fish stocks.[221] Concern has been voiced regarding repeated expeditions in the deep-sea or collecting great quantities of a targeted material, particularly in sensitive ecosystems.[222] There are examples of agreements of co-operation between marine scientists, in order to avoid repeated expeditions to the same deep-sea sites.[223] Such agreements are voluntary and not comprehensive. Regarding marine bioprospecting in the drug industry, Hunt and Vincent describe initial sampling as requiring small quantities to determine if a compound registers bioactivity and may produce a "hit", which may in turn be developed into a candidate for pre-clinical trials, called a "lead". The quantities then sampled in secondary collection may vary. There are examples of secondary collections of several metric tons resulting in only a few grams of an active compound. Technological advancements probably make such collections less likely, such that only a one and a half kilograms of collection of a sponge yields sufficient amounts of the targeted compound to allow preclinical trials.[224] At this scale, this activity would not, in normal circumstances and ecosystems, trigger particular measures under UNCLOS article 117. In sensitive ecosystems, however, particular measures may be warranted depending on the specific situation of a cruise and the ecological circumstances.

17, Seabed Disputes Chamber of the International Tribunal for the Law of the Sea, 1 February 2011, paragraph 148. The validity of the argument for activities in the high seas is less certain.

[221] On overfishing in the last century, see Ausubel, *First Census of Marine Life: Highlights of a Decade of History*, 2010, p. 27.

[222] See e.g. Leary, *International Law and the Genetic Resources of the Deep Sea*, 2007, p. 189.

[223] Glowka, "Putting Marine Scientific Research on a Sustainable Footing at Hydrothermal Vents", 2003, p. 308; Warner, *Protecting the Oceans Beyond National Jurisdiction: Strengthening the International Law Framework*, 2009, p. 21; Hayes, "Charismatic Microfauna", 2007, p. 697.

[224] Hunt and Vicent, "Scale and Sustainability of Marine Bioprospecting for Pharmaceuticals", 2006, pp. 58-59. See also Farrier and Tucker, "Access to Marine Bioresources", 2001, p. 218.

Resource regulation under UNCLOS applies irrespectively of whether the high seas resources are found in surface water or at several thousand meters depth. Concerning the resources of the seabed, however, the legal situation may differ. The next section will explore the legal issues arising when the regime of the high seas meets the regime of the continental shelf.

2.2.3. Resource regulation: navigating in the muddy waters of the continental shelf

Bioprospecting at great depths is interesting for a number of reasons. From the viewpoint of science and industry, great depths may promise great discoveries. High pressure can in itself be an indicator of marine life that has developed particular characteristics to adapt this climate. The greats depths are also the location for many hydrothermal vents, seamounts, cold seeps, and deep water coral reefs that create biotopes that are particularly rich in biodiversity and thus highly interesting for bioprospectors.[225] Sedentary species are viewed today as most interesting because they often have developed chemical compounds that can, for instance, deter predators and parasites.[226] The most recent estimate indicates that at least 14 companies have been involved in bioprospecting for deep-sea genetic resources.[227] It can therefore be assumed that the legal status of resources in waters bordering the continental shelf and the high seas may be of practical interest. From a legal point of view, the bioprospecting in this area poses questions of interpretation concerning which natural resources belong to which legal regime. These questions will be explored in the following.

Resource regulation pertaining to the continental shelf is found in UNCLOS Part VI. Exploring and exploiting the natural resources of the continental shelf is the sovereign right of the coastal state.[228] Article 78 provides that coastal state rights over the continental shelf

[225] See Leary, "Bioprospecting and the Genetic Resources of Hydrothermal Vents on The High Seas", 2004; Scovazzi, "The Seabed Beyond the Limits of National Jurisdiction: General and Institutional Aspects", 2010, p. 48.
[226] Arico and Salpin, *Bioprospecting of Genetic Resources in the Deep Seabed*, 2005, p. 30.
[227] Leary, *International Law and the Genetic Resources of the Deep Sea*, 2007, p. 163. The author also reckons that at least six of these companies have marketed products from these resources.
[228] UNCLOS, article 77(1).

do not "affect the legal status of the superjacent waters" above the continental shelf.[229] From this, there is an adjacency of the regime of the continental shelf, and of the high seas where there is no EEZ that extends beyond the continental shelf.[230]

Article 77 provides that exploring and exploiting the natural resources of the continental shelf require the "express consent" of the coastal state.[231] Read separately, this would entail that all bioprospecting that comprises continental shelf material would be subject to coastal state consent. Read in context with the definition of "natural resources" of the continental shelf, the question is more complex. These are defined as "mineral and other non-living resources of the sea-bed and the subsoil thereof together with living organisms belonging to sedentary species". [232] A nearly identical definition is found the Convention on the Continental Shelf.[233] Leary explains that these two main groups of resources reflect two very separate legal traditions.[234] The mineral and other non-living resources refer to the doctrine of unilateral claims to oil and mineral resources of the continental shelf made after 1945. The reference to sedentary species reflects another form of claims, which can be traced back to the mid-19th century when the first states made harvesting claims to sedentary species beyond the narrow strip of the territorial sea.[235] The question is how the terms as they appear in UNCLOS today affect the obligation to obtain coastal state consent for bioprospecting close to the continental shelf where this extends beyond the EEZ.

A first remark that can be made is that non-sedentary species are not part of the "resources of the continental shelf". These are resources of the high seas (or the EEZ). Harvesting these species would not require coastal state consent. Sedentary species are defined as "organisms which, at the harvestable state, either are immobile on or under the sea-bed or

[229] Ibid., article 78(1).
[230] Ibid., articles 86 and 57.
[231] Ibid., article 77(2).
[232] Ibid., article 77(4).
[233] Convention on the Continental Shelf, article 2(4).
[234] Leary, *International Law and the Genetic Resources of the Deep Sea*, 2007, pp. 79-94. See also Prows, "Tough Love: The Dramatic Birth and Looming Demise of Unclos Property Law (and What Is to Be Done About It)", 2007, pp. 251-258.
[235] Leary, *International Law and the Genetic Resources of the Deep Sea*, 2007, pp. 82-84.

are unable to move except in constant physical contact with the sea-bed".[236] Allen points out that this definition has little or no relationship with biological taxonomy.[237] The qualifying term "harvestable state" is not further defined in the treaty text. One ordinary meaning of the words suggests they be in a condition of ripeness for harvesting. This entails a notion of being sufficiently developed for collection that may be reasonable for harvest by fishing. Applied to the context of harvest by bioprospecting, on the other hand, identification of "harvestable state" may become more problematic. Determining the "harvestable state" of e.g. bacteria is a challenge. In situations of exploratory sampling, such as in bioprospecting, the characteristics of species are unknown prior to the collection. Knowing in advance whether these are at a "harvestable state" may be difficult.

Sedentary species are furthermore those which are "immobile" or "unable to move except in constant physical contact with the sea-bed", which are also criticised criteria.[238] Again, the on-site classification calls for considerable prior knowledge of the characteristics of the biological material. Also, for the case of living resources in mid-oceanic ridges and their hydrothermal vents, regimes may overlap: as Leary points out, the hydrothermal plume often extends to hundreds of metres in the water column above and around hydrothermal vents. Within one ecosystem there will be both macrofauna and microfauna that fall within and outside the scope of sedentary species.[239] Consent will be required for harvesting some of these species, but not for others.[240] This means that the boundaries of the applicable legal regimes do not coincide with the ecological boundaries of deep-sea ecosystems.[241]

The easy way out is of course to obtain the express consent of the coastal state. If not, legal navigation in the waters of somewhat impractical definitions makes access to these high

[236] UNCLOS, article 77(4).
[237] Allen, "Protecting the Oceanic Gardens of Eden: International Law Issues in Deep-Sea Vent Resource Conservation and Management", 2001, p. 621.
[238] Leary, "Bioprospecting and the Genetic Resources of Hydrothermal Vents on The High Seas", 2004, p. 150. See also Allen, "Protecting the Oceanic Gardens of Eden", 2001, pp. 624-625, who discusses diverging state practices on specie mobility.
[239] Leary, "Bioprospecting and the Genetic Resources of Hydrothermal Vents on The High Seas", 2004.
[240] On the ecosystems of the deep-seabed, see generally Leary, *International Law and the Genetic Resources of the Deep Sea*, 2007, pp. 7-27.
[241] From the perspective of coastal states, the question arises of how to adequately protect these resources, see Mossop, "Protecting Marine Biodiversity on the Continental Shelf Beyond 200 Nautical Miles", 2007.

seas resources theoretically possible, but demands a great amount of knowledge. The definition of article 77 is a further example of the practical problem in applying provisions that were not crafted for bioprospecting to this activity.

Bioprospecting at great depths is also a question of access to the vast seabed beyond the continental shelf. The next section aims to explore the legal framework for bioprospecting in waters bordering the high seas and the Area.

2.2.4. Bioprospecting at great depths: closing in on the Area

The Area is defined in UNCLOS article 1(1) as "the sea-bed and ocean floor and subsoil thereof beyond the limits of national jurisdiction". UNCLOS Part XI, as modified by the Implementation Agreement,[242] establishes a regime for activities in the Area that is distinct from that of the high seas.[243] The task here is to identify the resource regulation in place for biological material in waters bordering the Area and the high seas.

Part XI establishes an elaborate framework for access to, and sharing of, the resources of the Area.[244] Article 136 states as a fundamental principle that the Area and its resources are "the common heritage of mankind". No state can claim or exercise sovereign rights over "the Area or its resources", nor are these resources subject to appropriation by states and persons.[245] Part XI establishes a separate governing body, the International Seabed Authority (ISA), which will act on behalf of "mankind as a whole" concerning the resources of the Area.[246] Yet, as mentioned above, article 133 stipulates that the resources of the Area are "all solid, liquid or gaseous *mineral* resources in situ in the Area at or

[242] *Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982* [Implementation Agreement Relating to Part XI], United Nations, 16 November 1994, 1836 UNTS 3.
[243] UNCLOS, article 134(2) states that "[a]ctivities in the Area shall be governed by the provisions of this part".
[244] On the historic development that led to the creation of this new regime, see Churchill and Lowe, *The Law of the Sea*, 1999, pp. 224-238.
[245] UNCLOS, article 137(1).
[246] Ibid., article 137(2).

beneath the sea-bed, including polymetallic nodules".[247] Biological resources are thus not considered "resources" in relation to Part XI. The mandate of the ISA extends to managing the "resources of the Area", but not biological resources on the seabed beyond national jurisdiction. This demarcation has its background in the context in which UNCLOS was negotiated. At the time, immense expectations were held for the commercial prospects of deep-sea mining.[248] To date, no commercial exploitation of the mineral resources from the deep-sea has taken place under the auspices of the ISA. This is due, among other factors, to the immensely high costs of seabed mining compared to land-based mining and the costs of development of technologies to conduct mining in such hostile environments.[249] Bioprospecting, although expensive, is on the other hand currently taking place in deep-sea environments. The situation has been described as "the deepest of ironies"[250]: the international community has established an elaborate system for resources that are not currently exploitable, but resources that are being exploited are not explicitly regulated.

This raises the question of what framework applies for the biological resources of the seabed. Treves synthesises several positions that are held by states: some see the regime of the Area as comprising biological resources, on the basis of an analogy from "sedentary species" being included in the regime of the continental shelf. Others approach the question from article 143, which provides that MSR in the Area shall be conducted "for the benefit of mankind as a whole".[251] This approach, however, calls for agreement on the issue of whether bioprospecting is indeed MSR or not. If one retains the idea that bioprospecting is a form of MSR, this approach could be a fruitful point of departure, securing open access and publication of research results and linking this to the objectives of the benefit of humankind. As a counter-argument to such an approach is the context in which the provisions on the Area are found; a clear distinction is drawn between MSR and

[247] Ibid., article 133(a). [emphasis added]
[248] See the speech held by the Maltese ambassador to the UN, Arvid Pardo, launching the concept of the common heritage of mankind: United Nations General Assembly, *Agenda Item 92*, 1967; Leary, "International Law and the Genetic Resources of the Deep Sea", 2009, p. 355.
[249] Scovazzi, "The Seabed Beyond the Limits of National Jurisdiction: General and Institutional Aspects", 2010, p. 49.
[250] Glowka, "The Deepest of Ironies", 1996.
[251] Treves, "Principles and Objectives of the Legal Regime Governing Areas Beyond National Jurisdiction", 2010, p. 17.

prospecting for mineral resources. A contextual interpretation could then suggest that a distinction of pure and applied research should be upheld also for biological resources. Yet, well after the discovery of commercial applications to deep-sea marine biological resources, no changes were made or suggested to incorporate biological resources by the Implementation Agreement.[252] The views currently expressed by states can be seen as more strategic than expressions on the current legal status.[253] They reflect the need to refrain from making concessions too early for the case of future regulations of biological material in ABNJ.[254] The likely conclusion is therefore that the biological resources of the Area are not "common heritage of mankind" resources, and that they currently are regulated by the high seas regime, as reflected in UNCLOS and customary law. At the same time, the answer to this question cannot be given categorically, as a great number of states express a different understanding of international law. Though for the time being, the difficult task of distinguishing seabed and the high seas biological resources is an exercise that is more relevant in relation to the continental shelf than to the Area.

2.3. Closing remarks on the legal framework applicable to bioprospecting

Bioprospecting is an activity that can lawfully take place in the high seas, yet it is subject to a number of conditions. By adopting an activity perspective, it has been shown that obligations under UNCLOS vary depending on the legal grounds for exerting a freedom of the high seas. Currently, there is no definite answer to whether the legal basis for bioprospecting is MSR or something else. There may be a conflict between intellectual property law and the effective implementation of UNCLOS for both cases. This conflict is apparent when the Convention provides for benefits to be shared, through publishing of research results or promoting technology transfer. These existing benefit-sharing mechanisms and their practical shortcomings must be noted as a foundation for *de lege ferenda* discussions on ABS for high seas bioprospecting.

[252] Hayes, "Charismatic Microfauna", 2007, p. 688.
[253] Treves, "Principles and Objectives of the Legal Regime Governing Areas Beyond National Jurisdiction", 2010, p. 17.
[254] Ibid.

By adopting a resource perspective, it has been shown that biological material in the high seas may be freely exploited by bioprospectors. Conditions also apply to resource exploitation of this nature. However, the fact that bioprospecting is generally seen as an activity that has a modest ecological footprint should be borne in mind when searching for regulatory options.

3. Current discussions and approaches to ABS

In this chapter, approaches to ABS and bioprospecting that are made in different international organisations and fora will be briefly surveyed. The objective is not to describe these comprehensively, but to capture regulatory options that exist or are being discussed in on-going processes. This creates a basis for later outlining options for regulating the question of rights, of access to high seas bioprospecting and of benefit-sharing.

3.1. Methodology

The selected organisations and fora are the CBD, the FAO, the Antarctic Treaty System and the United Nations Ad Hoc Open-ended Informal Working group to study issues relating to the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction. These four are chosen because issues of bioprospecting or ABS have been regulated under these conventions or organisations or they are being discussed in these fora. They all are or have the potential to be creators of norms that may be relevant to the question of regulatory options for high seas ABS. This choice means that discussions taking place in other fora, such as the WIPO or the WTO, will not be discussed further in this thesis.

When exploring on-going discussions of high seas regulation or ABS issues, it is important to note that these discussions are not reflected in any treaty text, customary law or general

principles. The method employed here will to study certain existing treaty obligations and to further perform a desktop study of official meeting reports and documents in order to discern outputs from these fora. It is important to note that such documents are legally non-binding.[255] Furthermore, official meeting reports do not necessarily comprehensively reflect the discussions that take place. Reports may sometimes be consensus based summaries and thus not fully represent the views of parties. This methodological challenge will be partially amended by augmenting the analysis with academic literature, where this is available. On one account, recourse will also be had to personal communication where the information sought is not available in the official meeting reports. The content of this information, however, is widely known to participants in that forum.

3.2. CBD and the Nagoya Protocol

3.2.1. CBD and the sea

The Convention on Biological Diversity establishes standards for conduct towards components of biodiversity.[256] It introduces what has been labelled "the grand global bargain" by striking a balance between conservation of biodiversity, its sustainable use and the fair and equitable sharing of benefits that arise from using genetic resources.[257] In the CBD, sovereign rights over genetic material within state jurisdiction are conferred to that state.[258] Provisions and measures to be taken for the conservation and sustainable use of biodiversity are found in articles 6 to 14, such as the monitoring of biodiversity, measures for *in situ* and *ex situ* conservation, and impact assessments.

The CBD makes no distinction between marine, terrestrial or other components of biodiversity. Biodiversity is defined as the "variability among all living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the

[255] Compare ICJ Statute, article 38.
[256] See Kiss and Shelton, *Guide to International Environmental Law*, 2007, pp. 178-182; Sands, *Principles of International Environmental Law*, 2003, pp. 515-523.
[257] See CBD, article 1.
[258] Ibid., article 3.

ecological complexes of which they are part".[259] Article 22 regulates the relationship to the law of the sea; the CBD shall be implemented "with respect to the marine environment consistently with the rights and obligations under the law of the sea".[260] In relation to the high seas, article 4 is a key provision, stating that the CBD obligations apply to activities and processes that are carried out under the jurisdiction or control of a state, "within the area of national jurisdiction or beyond the limits of national jurisdiction", thus including the high seas.[261] For bioprospecting in the high seas a number of the measures to be taken for the conservation of biodiversity can thus be relevant for bioprospectors flying the flag of a state signatory to the CBD.[262] In this respect, CBD provisions has the potential to complement the legal framework for high seas bioprospecting.

As stated above, the concept of ABS stems from the CBD, though redistributive principles are clearly present within earlier instruments, such as UNCLOS. The CBD sets forth a bilateral or contractual approach to ABS:[263] as a *quid pro quo* for access to GR, the source country or provider of GR is (ideally) awarded benefits, be they monetary or non-monetary, by the user. Article 15 of the Convention provides that access shall happen on "mutually agreed terms" and subjected to the "prior informed consent" of the providing party.[264] Parties shall "take legislative, administrative or policy measures" with the aim of sharing "in a fair and equitable way […] the benefits arising from the commercial and other utilization of genetic resources" with the providing party.[265] Early on, it became clear that the benefit-sharing provisions were too general to provide an effective regime for ABS and very few user countries had taken the substantive legislative measures.[266]

As concerns the high seas, no party has sovereign rights over these resources, and article 15 thus has no direct consequences in terms of mandatory benefit-sharing for utilisation of GR

[259] Ibid., article 2.
[260] Ibid., article 22(2).
[261] Ibid., article 4(b). See also article 5.
[262] Arico and Salpin, *Bioprospecting of Genetic Resources in the Deep Seabed*, 2005, p. 38.
[263] Bilateral is understood as an agreement between two state parties. The reference to a contractual approach refers to the common situation where one of the parties to an ABS agreement is not a state.
[264] CBD, article 15(4)(5). See also article 19(2).
[265] Ibid., article 15(7).
[266] Koester, "Nagoya-protokollen om Genetiske Ressourcer", 2011, p. 107.

carried out under state jurisdiction and control in ABNJ.[267] The Conference of the Parties (COP) to the CBD has engaged in discussions on the relationship of the Convention to ABNJ on several occasions. Regarding conservation of biodiversity in these areas, the COP has agreed that there is an urgent need for international cooperation and action to improve conservation and sustainable use of biodiversity in areas beyond national jurisdiction.[268] As regards the question of benefit-sharing for ABNJ, the question arose under negotiations for the Nagoya Protocol to the Convention.

3.2.2. The Nagoya Protocol article 10

The Nagoya Protocol (NP) was adopted in October 2010, but is not yet in force.[269] It represents an effort in a series of actions by the COP to more effectively achieve the great global bargain foreseen by the Convention. The Protocol offers new solutions for the realisation of the third objective of the CBD, namely the access to, and fair and equitable sharing of, the benefits arising from the utilisation of genetic resources.[270] The jurisdictional scope of the Protocol is the same as under the Convention, as pertains to genetic resources.[271] In discussions leading up to COP 10 in Nagoya and during the COP, African delegations presented the view that many ABS problems could only be resolved through multilateral solutions, and consequently suggested establishing a global financial mechanism for cases that do not easily fit into the otherwise predominantly bilateral or contractual ABS approach.[272] An illustration of these cases was noted in a non-paper, which is included in part as annex to this thesis. Among these cases were GR from the high

[267] CBD, article 4(2).
[268] COP7, *Decision VII/5: Marine and Coastal Biological Diversity*, CBD, 2004, paragraph 34. In later COP decisions, the central role of the UN General Assembly for conservation in ABNJ has been emphasised, see COP10, *Decision X/29: Marine and Coastal Biodiversity*, CBD, 2010, paragraph 21.
[269] It will enter into force 90 days after deposit of the fiftieth instrument of ratification. In May 2012, there were 92 signatories to the protocol and four ratifications.
[270] CBD, article 1. On benefit-sharing provisions under the NP, see Koester, "Nagoya-protokollen om Genetiske Ressourcer", 2011, pp. 111-113; Nijar, *The Nagoya Protocol on Access and Benefit Sharing of Genetic Resources: An Analysis*, 2011, p. 27. See also generally, Billé, et al., *La CdP de Nagoya: un succès pour la gouvernance mondiale de la biodiversité*, 2010; Jardin and Chiarolla, "Implications of the Nagoya Protocol", 2011.
[271] NP, article 3.
[272] Pierre du Plessis, *African Proposal to MLS*, 11 October 2011. Most of the ABNJ arguments of the African Group were made verbally.

seas. Other parties were highly reluctant.[273] African negotiators later indicated that the proposals for the Protocol to apply to pre-CBD material and to ABNJ could be dropped in exchange for a global mechanism for the sharing of benefits from the use of such material.[274] Yet disagreement persisted and the conflict later resulted in article 10 of the Protocol as part of a compromise package. The provision was proposed at the last minute by the Japanese hosts and the article has not been subject to negotiations.[275] Contrasting the otherwise contractual approach to ABS of the CBD and NP, article 10 states that parties "shall consider the need for and modalities of a global multilateral benefit-sharing mechanism to address the fair and equitable sharing of benefits derived from the utilization of genetic resources […] that occur in transboundary situations for which it is not possible to grant or obtain prior informed consent". Article 10 thus provides no immediate binding obligations on the parties, apart from an obligation to "consider" a question.

The question is whether the provision as it now stands may cover a mechanism applicable to bioprospecting in the high seas. Bioprospecting means utilisation of GR in the sense that the resources are used or developed to achieve a commercial objective. Whether high seas bioprospecting is a "transboundary situation" is more open for different interpretations. The term "transboundary" can indicate something crossing a line of jurisdiction, from one state to another. "Transboundary" may also refer to something, GR in this case, that is present on several sides of a boundary. As the term "boundary" is used in UNCLOS it would appear to relate to lines of jurisdiction between opposite of adjacent states, and not necessarily to a delimitation concerning the high seas.[276] Against this, it can be contended that it is not illogical to classify the line marking the outer limit of an EEZ or contiguous zone as a boundary, even though the line is drawn between this zone and the high seas, and not another state. The context in which article 10 was adopted, as a result of the African

[273] Jungcurt, et al., *Summary of the Resumed Ninth Meeting of the Working Group on Access and Benefit-Sharing of the Convention on Biological Diversity*, 19 July 2010.
[274] Buck and Hamilton, "The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity", 2011, p. 59.
[275] See e.g. Jungcurt, et al., *Summary of the Tenth Conference of the Parties to the Convention on Biological Diversity*, 1 November 2010.
[276] UNCLOS, article 298(1)(a)(i), referring to articles 15, 74 and 83.

position, might be an argument for this being a transboundary situation. There is as of yet no clear answer to which of these interpretations will prevail.

Furthermore, the question is whether high seas bioprospecting constitutes utilisation "for which it is not possible to obtain prior informed consent". Prior informed consent, as the term is encountered, though not defined, in the CBD article 15, is one of the pillars of the ABS system of the CBD and the NP. It reflects the geographical scope of the CBD, where there is indeed a providing party that can give such consent prior to conceding access to GR under its jurisdiction. The impossibility of obtaining consent is a wide formulation, and may include impossibility due to temporal, jurisdictional or other preventing circumstances.[277] As pertains to the high seas, there is no providing entity or authority that might grant consent. Prior informed consent would thus be impossible to obtain for utilisation of GR in the high seas. Yet access to GR in the high seas is, as seen in chapter 2, open under the law of the sea. From an UNCLOS perspective, it can be remarked that impossibility of obtaining consent to activities that do not require consent, seems a peculiar logical construction. If impossibility of obtaining prior informed consent to access to high seas GR would constitute a rationale for a multilateral system under the CBD, renewed considerations on the legal status of MSR and the relationship between the CBD and UNCLOS would be called for.[278]

Further discussion on the scope and meaning of article 10 has not yet taken place in official CBD fora. An Intergovernmental Committee is scheduled to consider the need for and modalities of such a mechanism in July 2012.[279] It does seem fair to assume that interpretations of the scope article 10 may benefit from the Protocol entering into force and the resolution of other pressing issues concerning the functionality of the NP in areas under national jurisdiction. When searching for the exact meaning of article 10, it must also be added that an obligation to "consider" something is a vague and soft obligation. Article 10

[277] Tvedt, *A Report from the First Reflection Meeting on the Global Multilateral Benefit-sharing Mechanism*, 2011, p. 12.
[278] See NP, article 3.
[279] Protocol, *Annotated Provisional Agenda*, Convention on Biological Diversity, 24 February 2012 (UNEP/CBD/ICNP/2/1/Add.1/Rev.1), p. 5.

might just be one of the provisions that make the Protocol merit the characterisation given by some parties as a "masterpiece in creative ambiguity".[280] When discussions on article 10 take place, the direction that they take will probably be of greater importance to a multilateral scenario for ABNJ than attempts at deciphering the provision itself.

The Protocol and the debate surrounding it show, however, that creating a multilateral benefit-sharing mechanism for bioprospecting in the high seas is an option that is favoured by some, and which is currently up for discussion.

3.3. ABS approaches under the FAO

Agrobiodiversity is a sub-category of biodiversity and comprises aquatic biodiversity.[281] Whereas conservation and benefit-sharing under the CBD is regulated irrespective of the sector or objective of use, the focus now shifts to biological material used directly or indirectly for food. This section seeks to describe some of the approaches to ABS under the auspices of the United Nations Food and Agriculture Organization of the United Nations (FAO).

3.3.1. The International Treaty on Plant Genetic Resources

The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) was adopted in 2001 at the 31st meeting of the FAO Conference and came into force in 2004. The scope of the treaty Treaty is only to a limited extent relevant to bioprospecting, as plant breeding and research on known *ex situ* resources are the main users of GR covered by the treaty. Yet, the multilateral system it establishes may provide experiences relevant for a multilateral approach to high seas ABS.

[280] Jungcurt, et al., *Summary of the Tenth Conference of the Parties to the Convention on Biological Diversity*, 1 November 2010.
[281] Santilli, *Agrobiodiversity and the Law: Regulating Genetic Resources, Food Security and Cultural Diversity*, 2012, pp. 1-12.

Its objectives are consistent with those of the CBD, as the treaty seeks the conservation and sustainable use of plant genetic resources for food and agriculture, and the fair and equitable sharing of benefits that arise from this use, "in harmony with" the CBD.[282] States detain sovereign jurisdiction over plant GR for food and agriculture under the ITPGRFA.[283] How ABS is envisaged differs in the two conventions. Part IV of the Treaty sets forth a multilateral system that establishes a common pool for plant genetic resources. The resources that enter the pool are limited to 35 food crops and 29 forage plants, specified in Annex I to the Treaty, which are under the control of parties and in the public domain.[284] This excludes GR from the high seas. The GR held in the mechanism are principally those GR listed in Annex 1 that are held in the *ex situ* collections of the research centres of the Consultative Group of the International Agricultural Research (CGIAR).[285] The CGIAR is an association regrouping a network of 15 research centres, dedicated to research on agriculture and food production.[286]

3.3.2. Lessons learned from the ITPGRFA on ABS

In article 12, the ITPGRFA sets forth a system of facilitated access to the common pool for natural and legal persons under the jurisdiction of the parties. Facilitated access can in itself be considered a form of benefit-sharing. Access is given solely for utilisation and conservation for "research, breeding and training for food and agriculture, provided that such purpose does not include chemical, pharmaceutical and/or other non-food/feed related industrial uses".[287] Of course, this restriction on allowed uses of the information reflects the material scope of the Treaty to plant GR for food and agriculture. Yet, this approach to multilateralism is not easily transferable to a bioprospecting context characterised by the

[282] ITPGRFA, article 1(1.1).
[283] Ibid., article 10.
[284] Ibid., article 11.2.
[285] Ibid., article 11.5. See Chiarolla and Jungcurt, *Outstanding Issues on Access and Benefit Sharing under the Multilateral System of the International Treaty on Plant Genetic Resources for Food and Agriculture*, 2011, p. 13.
[286] On the history and functioning of the CGIAR, see Fowler and Mooney, *Shattering: Food, Policies and the Loss of Genetic Diversity*, 1990, pp. 150-151; FAO, *The State of the World's Plant Genetic Resources for Food and Agriculture*, 1997, p. 253; Brahy and Louafi, *The Role of the Research Sector in ABS Governance*, 2007, pp. 10-12.
[287] ITPGRFA, article 12(3)(a).

many and diversified final uses of GR. This shows that the ITPGRFA is not a model for high seas ABS that can be transposed to a high seas setting without important modifications.

Patents on products incorporating material in the common pool can be sought, but by the standard material transfer agreement signed to access the system, parties agree that they shall not seek rights that limit facilitated access to this material.[288]

The standard material transfer agreements must also include a requirement to recipients who commercialise a new product, to make a payment to the benefit-sharing mechanism.[289] This feature can theoretically be transposed to a high seas setting. The main idea is that of giving something back as a *quid pro quo* for the right to examine something that would otherwise not be available. If biological material or other knowledge resulting from bioprospecting is held in a common pool, the right of access can be linked with a duty to give something back if the accession results in commercial success. Drankier *et alii* point out that there is no start or end date to the benefit-sharing obligations, which has made some parties cautious to the agreement.[290] They stress that that this should be taken into account for ABS solutions in ABNJ.[291]

To date, no mandatory payments have been made under the ITPGRFA.[292] A possible explanation is that it takes years to develop a stable plant variety, and that the system will not produce results for some time to come.[293] A less optimistic prediction would be that even in a few years, payments to the benefit-sharing mechanism would still not be a widespread phenomenon. At least so far, the IPGRFA cannot provide an example of

[288] See Drankier, et al., "Marine Genetic Resources in Areas Beyond National Jurisdiction: Access and Benefit-Sharing", 2012, p. 380 for a review of other conditions in the standard material transfer agreement.
[289] ITPGRFA, article 13.2(d)(ii).
[290] Drankier, et al., "Marine Genetic Resources in Areas Beyond National Jurisdiction", 2012, p. 381.
[291] Ibid., p. 385.
[292] Governing Body, *Reviews and Assessments under the Multilateral System and of the Implementation and Operation of the Standard Material Transfer Agreement*, The International Treaty on Plant Genetic Resources for Food and Agriculture, 2011 (IT/GB-4/11/13), paragraph 42.
[293] Lightbourne, "The FAO Multilateral System for Plant Genetic Resources for Food and Agriculture: Better than Bilateralism?", 2009, p. 470.

successful monetary benefit-sharing that can be applied without further scrutiny to the high seas.

3.4. Bioprospecting discussions in the ATCM

Antarctica is the area south of 60 degrees South latitude, including the ice shelves, excluding the seas beyond these ice shelves.[294] The main governing mechanism is the Antarctic Treaty System (ATS) and the fundamental treaty therein is the Antarctic Treaty. Several bodies under the ATS discuss and work on issues of bioprospecting, such as Scientific Committee on Antarctic Research and the Committee for Environmental Protection. In the following, discussions under the executive body, the Antarctic Treaty Consultative Meeting (ATCM), will be discussed.

3.4.1. Bioprospecting under ATS

Since it was first discussed by the ATCM in 2002, the issue of bioprospecting in the Antarctic has received increasing attention from state parties.[295] No ATS instrument specifically addresses bioprospecting, yet high expectations are sometimes expressed as to what the ATCM might accomplish in terms of bioprospecting policies.[296] The legal and institutional framework of the ATS presents certain characteristics that are absent in other instruments governing areas unpopulated by humans. First of all, compared to the multitude of parties to the UNCLOS, ATS is something of a microcosm. Compared to the 162 parties to UNCLOS, there are 28 consultative parties with the right to participate in decision-making under ATCM. Theoretically, there could be a possibility that interests converge to a greater degree and that reaching a common ground on bioprospecting could be less challenging. More significantly, the Antarctic Treaty reflects the unique balance struck on the different claims of sovereignty to Antarctic areas.[297] The Treaty builds upon

[294] *Antarctic Treaty* [Antarctic Treaty], 1 December 1959, 402 UNTS 72, article VI.
[295] Antarctic Treaty Consultative Meeting (ATCM), *Final Report of the Twenty-Fifth Antactic Treaty Consulative Meeting*, 25th ATCM, 2002, paragraph 58.
[296] See Antarctic Treaty Consultative Meeting (ATCM), *Biological Prospecting in the Antarctic Treaty Area – Scoping for a Regulatory Framework (Working paper submitted by The Netherlands, Belgium and France)*, 30th ATCM, 2007 (WP36, Agenda Item 17), paragraph 1.
[297] Vidas, "The Antarctic Treaty System in the International Community: An Overview", 1996, p. 37.

freedom of scientific research,[298] exchange of scientific results[299] and international cooperation[300] as fundamental principles. The provisions of the Madrid Protocol further strengthen the legal protection of Antarctic environment.[301] The Protocol comprises modern principles of environmental law, such as the ecosystem approach[302] and elaborates requirements of prior impact assessments.[303] Bioprospecting is thus subject to prior impact assessments.[304]

Of particular interest when comparing the legal regimes of UNCLOS and ATS, is the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).[305] This Convention sets down as fundamental principle for harvest of all marine living resources in Antarctica the prevention of populations decrease, maintenance of ecological relationships between "harvested dependent and related populations", and the prevention of changes in marine ecosystems that cannot be reversed during a period of two to three decades.[306] The Convention establishes a Commission that gives effect to these three principles of conservation.[307] Also noteworthy is the geographical scope of the CCAMLR. In contrast to the Antarctic Treaty and the Madrid Protocol, it applies not only to the areas south of 60 degrees South latitude, but also the segment between that latitude and the "Antarctic Convergence which form part of the Antarctic marine ecosystem".[308] This is a considerable geographical expansion. Bioprospecting done by CCAMLR parties in parts of the sea that would otherwise be governed by the regime of the high seas, is hence subject to the provisions of this treaty and the authority of the Commission.

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[298] Antarctic Treaty, preamble, paragraphs 2 and 3; articles III and VII.
[299] Ibid., article III(1)(c).
[300] Ibid., article II.
[301] *Protocol on Environmental Protection to the Antarctic Treaty* [Madrid Protocol], 4 October 1991. On the applicability of the Protocol to microorganisms, see Antarctic Treaty Consultative Meeting (ATCM), *Concepts, Terms and Definitions, including a Comparative Analysis (Information paper by Sweden, Belgium, Finland, France, the Netherlands and Spain)*, 32nd ATCM, 2009 (IP70, Agenda Item 17), p. 6.
[302] Madrid Protocol, article 3(1).
[303] Ibid., article 8, which is further outlined in Annex I to the Protocol.
[304] Ibid., Annex I, article 1. See also Annex II, article 3.
[305] *Convention on the Conservation of Antarctic Marine Living Resources* [CCAMLR], 20 May 1980, 1329 UNTS 48.
[306] Ibid., article II(3)
[307] Ibid., art IX.
[308] Ibid., article I(1).

On the one hand, the ATS framework can be seen as an ideal starting point for discussions of bioprospecting, since agreement has already been reached on elements that are key to developing bioprospecting policies. On the other hand, the situation can also be seen as one so comprehensively regulating scientific and environmental issues that further regulation is superfluous.[309]

These instruments make bioprospecting in Antarctica subject to considerably stricter conditions than for the high seas under UNCLOS. Nonetheless, there are several common denominators that make the comparison between the two regimes relevant. First, bioprospecting is on-going: currently 185 bioprospecting activities in Antarctica conducted or sponsored by 26 countries are registered with the Antarctica bioprospector database.[310] Patents are also being filed and have been granted, just as in the case of the high seas.[311] The real extent of Antarctic bioprospecting is not known, similarly to the situation in the high seas. Second, the issue of distinguishing pure research from applied research is also present in both contexts. Legal uncertainty could also be a disincentive to bioprospecting in both areas: in a report from the United Nations University, industry representatives express that uncertainty regarding the use of their findings and ownership of samples inhibits bioprospecting investments in the Antarctic.[312] Their partners, the scientists, report of inability to work with industry due to the absence of clear protocols on the exchange of information arising from commercial activities.[313] These are considerations worth keeping in mind when considering regulatory options for bioprospecting in the high seas.

[309] This gap of opinions among parties is reflected e. g. in a working paper for ATCM XXXIII in 2010, see Antarctic Treaty Consultative Meeting (ATCM), *Report of the ATCM Intersessional Contact Group to Examine the Issue of Bioprospecting in the Antarctic Treaty Area (Working paper submitted by the Netherlands)*, 33rd ATCM, 2010 (WP13, Agenda Item 17), paragraph 4.

[310] United Nations University. *Bioprospecting Information Resource: Antarctic* [online database]. <www.bioprospector.org/bioprospector/antarctica/home.action>.

[311] Eighteen companies were known to have applied for Antarctic-based patents in 2003, see Lohan and Johnston, *Bioprospecting in Antarctica*, 2005, p. 10.

[312] Ibid. p. 13.

[313] Ibid.

It is against this backdrop of a modern environmental regulation coming up against the requirements of bio-science in a commercial era, that the ATCM now discusses the possibility of regulating the activity of bioprospecting specifically.

3.4.2. ATCM policy discussions

In 2002, parties to the ATCM recognised bioprospecting as a "very important matter" that raised "legal and political issues, as well as environmental issues".[314] Three years later, parties recommended that governments "keep under review the question of biological prospecting in the Antarctic Treaty Area".[315] Member states have repeatedly been invited to share information with the ATCM on bioprospecting activities undertaken by their nationals.[316] In 2011, several parties asserted that states should focus attention on bioprospecting in Antarctica and that, given developments in the CBD and the UN General Assembly, "there was now a sense of urgency on the issue".[317]

As a common ground of consensus parties concur that the ATS is the "appropriate framework for managing the collection of biological material in the Antarctic Treaty area and for considering its use"[318] and to keep the issue on the agenda and under "active consideration within the Antarctic Treaty system".[319] In 2011, broad support was expressed for the Nagoya Protocol to the CBD not applying to Antarctic bioprospecting.[320]

[314] Antarctic Treaty Consultative Meeting (ATCM), *Final Report of the Twenty-Fifth Antactic Treaty Consulative Meeting*, 2002, paragraph 68.
[315] Antarctic Treaty Consultative Meeting (ATCM), *Final Report of the Twenty-Eighth Antarctic Treaty Consulative Meeting*, 28th ATCM, 2005, Resolution 7, p. 435.
[316] See e.g. Antarctic Treaty Consultative Meeting (ATCM), *Argentine Activities of Bioprospecting and Bioremediation in Antarctica (Information Paper by Argentina)*, 29th ATCM, 2006 (IP112, Agenda Item 18).
[317] Antarctic Treaty Consultative Meeting (ATCM), *Final Report of the Thirty-fourth Antarctic Treaty Consultive Meeting*, 34th ATCM, 2011, paragraph 83.
[318] Antarctic Treaty Consultative Meeting (ATCM), *Final Report of the Thirty-Second Antarctic Treaty Consultative Meeting*, 32nd ATCM, 2009, Resolution 9, p. 289.
[319] Ibid.
[320] Antarctic Treaty Consultative Meeting (ATCM), *Final Report of the Thirty-fourth Antarctic Treaty Consultive Meeting*, 2011, paragraph 420.

No party appears to be of the view that access to biological material for bioprospecting should be restricted.[321] Opinions diverge as to the need for benefit-sharing, other than that already resulting from the obligation to share research results.[322] Some argue that there is no reason why benefits from the commercialisation of biological material should be treated differently than other Antarctic activities that are not subject to benefit-sharing.[323] Against this, others argue that when patents are established, the research is no longer freely available.[324] There is a parallel here with the difficulties arising under UNCLOS discussed above. Several suggestions have been put forth by parties advocating further benefit-sharing policies. Among the more radical are those made by the Netherlands to include both *in situ* and *ex situ* material in a multilateral system: *ex situ* material would remain in the system after its collection, but rights to possess and use material would automatically arise from the reporting of the collection to the competent authority.[325] When patents are established to research results from material in the system, benefits would be required to be shared to promote the objectives of the treaty, in particular scientific investigation.[326] A similar approach could be argued for the high seas.[327] Other proposals, such as sharing a percentage of benefits with the party under whose jurisdiction the research takes place,[328] are not so easily transferable. Discussions are also confronted with diverging opinions on whether the ATS should cover subsequent elements of product development. Some states argue that subsequent product development actions cannot easily fall within the scope of

[321] See e.g. Antarctic Treaty Consultative Meeting (ATCM), *Report of the ATCM Intersessional Contact Group to Examine the Issue of Bioprospecting in the Antarctic Treaty Area (Working paper submitted by the Netherlands)*, 2010 (WP13, Agenda Item 17), paragraph 11.
[322] Antarctic Treaty, article III(1)(c).
[323] Antarctic Treaty Consultative Meeting (ATCM), *Final Report of the Thirty-Second Antarctic Treaty Consultative Meeting*, 2009, paragraph 312.
[324] Antarctic Treaty Consultative Meeting (ATCM), *Report of the ATCM Intersessional Contact Group to Examine the Issue of Bioprospecting in the Antarctic Treaty Area (Working paper submitted by the Netherlands)*, 2010 (WP13, Agenda Item 17), paragraph 14.
[325] Antarctic Treaty Consultative Meeting (ATCM), *Principles for the Access to and Use of Biological Material in the Antarctic Treaty Area (Working paper submitted by the Netherlands)*, 33rd ATCM, 2010 (WP24, Agenda Item 17), paragraphs 3 and 8.
[326] Ibid., paragraph 11.
[327] A somewhat similar proposal will be discussed below, see section 4.3.2.
[328] Antarctic Treaty Consultative Meeting (ATCM), *Report of the ATCM Intersessional Contact Group to Examine the Issue of Bioprospecting in the Antarctic Treaty Area (Working paper submitted by the Netherlands)*, 2010 (WP13, Agenda Item 17), paragraph 14.

the Treaty, except for the overarching environmental principles of the Protocol.[329] Indeed, practical challenges may arise in regulating and tracking Antarctic biological material in the years following sampling. Legally, though, there are no barriers to extending the scope of the treaty to subsequent uses by nationals to signatory states, as an expression of state sovereignty.

To conclude, it seems unlikely that benefit-sharing in a multilateral system or trust is right around the corner for Antarctic bioprospecting, given the resistance of some parties. This does not exclude progress on strengthening the sharing of research results or other non-monetary forms of benefit-sharing. If there is to be an ATS instrument that specifically addresses the issue of bioprospecting, it will probably reflect the jurisdictional particularities of Antarctica, the substantial body of environmental regulation in place and the important position awarded to scientific research. A possible Antarctic regulatory scenario could therefore not be adapted to the high seas without further scrutiny. A common regime for benefit-sharing in these areas is also hard to imagine, unless it is based entirely on voluntary mechanisms.

3.5. UN General Assembly and the Working Group

Apart from what might follow from NP article 10, none of the organisations and fora seen above directly address bioprospecting in the high seas. It is now time to turn to the forum in which the question has been addressed most specifically.

3.5.1. Mandate and potential

In 2004, the United Nations General Assembly established the Ad Hoc Open-ended Informal Working group to study issues relating to the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction,[330] hereinafter the Working

[329] Ibid., paragraph 7.
[330] United Nations General Assembly, *Oceans and the Law of the Sea*, 2004 (A/RES/59/24), paragraph 73.

Group.[331]

Present at the Working Group meetings are chiefly representatives from states, but also from intergovernmental organisations and non-governmental organisations. Their mandate is to "examine the scientific, technical, economic, legal, environmental, socio-economic and other aspects" of conservation and sustainable use of marine biodiversity in ABNJ.[332] Bioprospecting is but one of many issues discussed in the Working Group, but it remains one of the more controversial.[333] The Working Group shall indicate options to promote cooperation and coordination "for the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction".[334] It is therefore a forum that has the potential to be a creator of norms for bioprospecting in the high seas. In the mere establishment of the discussion forum, some see an evident preparing of ground for regimes that regulate the exploitation of genetic resources in ABNJ.[335]

As common ground, delegations value the conservation of marine biological material and the importance of scientific research.[336] Proposals put forth to protect the marine genetic resources in ABNJ include environmental impact assessments and marine protected areas (MPAs), though support is not unanimous.[337]

[331] Another UN forum where marine GR in ABNJ have been discussed, but on a relatively general level is the United Nations Open-Ended Informal Consultative Process on Oceans and the Law of the Sea, see e.g. Broggiato, "Marine Genetic Resources Beyond National Jurisdiction", 2011, p. 40.

[332] United Nations General Assembly, *Oceans and the Law of the Sea*, 2004 (A/RES/59/24), paragraph 73(a)(b).

[333] The term bioprospecting is not frequently employed, and reports tend to use the term "exploitation of GR".

[334] United Nations General Assembly, *Oceans and the Law of the Sea*, 2004 (A/RES/59/24), paragraph 73(d).

[335] Treves, "Principles and Objectives of the Legal Regime Governing Areas Beyond National Jurisdiction", 2010, p. 17.

[336] See e.g. Ad Hoc Open-Ended Informal Working Group, *Letter dated 15 May 2008 from the Co-Chaipersons of the Ad Hoc Open-Ended Informal Working Group to Study Issues Relating to the Conservation of Marine Biological Diversity in Areas Beyond National Jurisdiction to the President of the General Assembly*, United Nations General Assembly, 2008 (A/63/79), paragraphs 6 and 10.

[337] See e.g. Ad Hoc Open-Ended Informal Working Group, *Letter Dated 30 June 2011*, 2011 (A/66/119), paragraph 1.

3.5.2. Discussions on a future regime for biological material in ABNJ

Difficulties arise as to bioprospecting and the legal status of marine biological material. The only consensus regarding this issue appears to be the need to improve knowledge on existing activities, their costs and implications for the marine environment.[338] The dichotomy of the common heritage of mankind versus high seas freedom, as the relevant regime for biological material of the seabed, is clearly reflected throughout the five meetings held to date. Chief arguments are that General Assembly Resolution 2749[339] and UNCLOS Part XI are part of customary law, and that the legal regime applicable is defined not by the nature of the resource but the zone in which it is situated.[340] Some of the representatives appear to argue that the common heritage regime should apply to ABNJ in general.[341] They call for new approaches to regulate ABS regarding these resources, and some suggest broadening the mandate of ISA in this respect.[342] From the meetings held to date, this seems to be one of the most reiterated regulatory options put forth. Yet it is a politically problematic one. One commentator labels parties advocating the common heritage approach to seabed GR as "fundamentalists".[343] Though this is an overstatement, it is clear that a discussion devoted to defending or denying the applicability of the common heritage regime is not likely to yield regulatory options. The regime of the Area has been subject to great controversy for a number of years, and is one of the reasons why the United States has not yet ratified UNCLOS.[344] Judging from reports from the 2012 meeting, controversy persists.[345] Also, the common heritage regime is tailored for mineral resource

[338] Broggiato, "Marine Biological Diversity Beyond Areas of National Jurisdiction", 2008, p.185.
[339] United Nations General Assembly, *Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, Beyond the Limits of National Jurisdiction*, 1970 (A/RES/25/2749).
[340] See e.g. Ad Hoc Open-Ended Informal Working Group, *Letter Dated 16 March from the Co-Chairpersons of the Ad Hoc Open-Ended Informal Working Group to the President of the General Assembly*, United Nations General Assembly, 2010, paragraph 71.
[341] See e.g. Ad Hoc Open-Ended Informal Working Group, *Report of the Ad Hoc Open-Ended Informal Working Group to Study Issues Relating to the Conservation and Sustainable Use of Marine Biological Biodiversity Beyond Areas of National Jurisdiction*, United Nations General Assembly, 2006, paragraph 71.
[342] Ibid.
[343] Leary, "International Law and the Genetic Resources of the Deep Sea", 2009, p. 366.
[344] Browne, "The Law of the Sea Convention and U.S. Policy", 2007, p. 195.
[345] Chiarolla, et al., *Marine Biodiversity Working Group Highlights: Tuesday, 8 May 2012*, 9 May 2012.

exploitation and does not answer questions of how benefit-sharing is to be done when inventions are patent protected.[346]

As middle ground between the common heritage most fervent objectors and defenders, the EU suggested in 2008 taking the ITPGRFA multilateral mechanism as a reference point for the discussions.[347] The proposal was welcomed by most parties, and opposed only by the United States and South Africa.[348] In subsequent meetings, reference was made to the ITPGRFA, though it seems that this has not led to concrete policy proposals.[349] This is perhaps not so surprising, given that the multilateral mechanism has yet to fulfil its intended benefit-sharing potential.

Reference has also been made to the International Seabed Authority Endowment Fund.[350] The fund is currently financed by donations, and enables scientists from developing countries to participate in MSR undertaken in the Area.[351] Severed from any ties to the ISA, it is a model that can be considered for the high seas. Benefits shared would then take the form of capacity building, more specifically training of personnel, cooperation in MSR, and possibly strengthening the sharing of research results.

Proposals have also been put forth to further the sharing of research results. For instance, it has been suggested that a network of ocean observatories could be created, or knowledge could be systemised and made easily accessible through standardised data management systems.[352] Systemisation and sharing knowledge were later proposed as taking the form of

[346] Leary, "International Law and the Genetic Resources of the Deep Sea", 2009, p. 366.
[347] Ad Hoc Open-Ended Informal Working Group, *Letter dated 15 May 2008*, 2008 (A/63/79), paragraph 38; Broggiato, "Marine Biological Diversity Beyond Areas of National Jurisdiction", 2008, p. 186.
[348] Broggiato, "Marine Biological Diversity Beyond Areas of National Jurisdiction", 2008, p. 186.
[349] Ad Hoc Open-Ended Informal Working Group, *Letter Dated 30 June 2011*, 2011 (A/66/119), paragraph 48.
[350] Ad Hoc Open-Ended Informal Working Group, *Report of the Ad Hoc Open-Ended Informal Working Group*, 2006, paragraph 11; Ad Hoc Open-Ended Informal Working Group, *Letter dated 15 May 2008*, 2008 (A/63/79), paragraph 35.
[351] See generally International Seabed Authority, *Endowment Fund*, 2012, <www.isa.org.jm/en/efund/>.
[352] Ad Hoc Open-Ended Informal Working Group, *Report of the Ad Hoc Open-Ended Informal Working Group*, 2006, paragraph 64.

improving the GRAMED database,[353] which is a database that currently holds a limited amount of information on certain activities in the sea.[354] Benefit-sharing in such a scenario would take the form of non-monetary benefits. It could provide for increased sharing of research results and thus a more effective implementation of UNCLOS article 244.

These proposals are examples of what state representatives view as possible modalities for benefit-sharing in the high seas. Some representatives, such as the EU, argue for creating an implementation agreement to UNCLOS, comprising also a "practical structure for ABS".[355] Others, such as the Russian representative, see no need for creating new instruments. In this situation, arguments for ABS understandably take a quite general form, and concrete suggestions on what ABS could look like a rare commodity. Generally, proposals draw inspiration from other instruments of international law or attempt to build upon existing voluntary mechanisms. In terms of being a creator of new ideas and norms for high seas ABS, the Working Group has perhaps not yet fully realised its potential.

3.6. Closing remarks on current discussions and approaches to ABS

The existing models and more or less loosely formulated suggestions on ABS can be grouped as either contractual, bi-lateral or multilateral, voluntary or mandatory. Emphasis can be put on fairness and equity, the conservation of biodiversity, the furthering of scientific knowledge, or various degrees of combination of these objectives. The discussions above show that some states are eager to apply the concept of ABS to new geographical areas and new biological material. Yet these states are confronted not only with the view held by some that ABS simply is a bad idea, but also with the difficulty of conceiving a system that would work. So far, neither the CBD nor the ITPGRFA can provide examples of truly successful legal regimes for benefit-sharing. A possible conclusion is that this gives a bleak outlook for ABS in general, including ABS for the high

[353] See generally UNEP, *Global and Regional Marine Assessment Database*, 2008, <www.unep-wcmc-apps.org/GRAMED/index.cfm>
[354] Ad Hoc Open-Ended Informal Working Group, *Letter Dated 16 March*, 2010, paragraph 80.
[355] Chiarolla, et al., *Summary of the Fifth Meeting of the Working Group on Marine Biodiversity Beyond Areas of National Jurisdiction*, 14 May 2012.

seas. Yet each of the organisations and treaties discussed above are naturally influenced by the particularities of either the geographical scope of the instruments or the resources regulated. As the discussions of the Working Group show, the high seas policies also have to face the jurisdictional particularities and the diverging opinions on the law that currently applies to bioprospecting. Mindful of this situation, and of various policy proposals for bioprospecting and ABS, the discussion now turns to outlining regulatory options for ABS in the high seas.

4. Considerations on regulatory options

4.1. Methodology and criteria for outlining regulatory options

The aim of this chapter is to discuss *de lege ferenda* regulatory approaches to bioprospecting in the high seas with a particular view to ABS. Rather than concluding on preferred solutions, the aim is to highlight qualities and drawbacks attached to the various alternatives.

The starting point from which policies are proposed is that of the current situation outlined above. Accordingly, a premise for the discussions is that existing rights and obligations under international law must be respected. Building upon existing rights and obligations is a well-known approach and a necessary way to address the question of future policies.[356] Existing rights and obligations, especially under UNCLOS and the TRIPS Agreement, are cornerstones on which any further high seas ABS regulation would have to build.

In order to evaluate different options, a set of criteria is proposed here. This more easily enables considerations of the advantages and drawbacks of different options. Four criteria are chosen for the assessment of regulatory options: the potential of a policy to spur

[356] In the context of UNCLOS, the Implementation Agreement relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks may serve as a noteworthy example. Concerning the CBD, the NP provides an example of this approach.

innovation, the potential to promote conservation, the potential to ensure sustainable use of marine biodiversity and whether a policy presents as a fair option. What is meant by these objectives and why they are pertinent criteria in this setting will now be elaborated upon.

The first criterion retained is that of the potential of a regulation to *spur innovation*. This is understood here as the potential to advance scientific knowledge in a manner that is beneficial to humanity and human activities. As such, it may just as well be purely scientific innovation that furthers knowledge of the ocean, as it may be applications of biological diversity that lead to commercial gain and new products available on the market. A major source of scepticism towards ABS in general, voiced by some developed states, is that "fair and equitable sharing" means putting unnecessary strain on the creators of innovation, i.e. industry and business, thus constituting a disincentive to innovate.[357] Though not a new argument, it should be seen in relation to the economic downturn in recent years. The biotechnology industry is currently undergoing difficult times. Despite the financial crisis of 2008, the revenue growth of global biotech industry was upheld in the following years. However, costs were cut by reducing investments in R&D: investment in biotechnology in the United States, Europe, Canada and Australia fell by 21 per cent in 2009.[358] In an industry where R&D is the fundamental ingredient for the innovation wanted by all parties, avoiding unnecessary strain on the creators of innovation is a key task. If high seas policies are seen as more burdensome than those applying to the EEZ, the latter jurisdictional zone may prove a preferred option for bioprospectors. In this perspective, policy makers have a choice of either designing a system that provides innovation incentives for bioprospecting in the high seas, or agreeing upon a geographically vast regime that incorporates the EEZ, the Area and maybe even the continental shelf. This latter option seems to be unlikely, judging from on-going discussions. ABS policies should not reduce incentives of researching parties to conduct bioprospecting. Not only would there be a greater chance of convincing the parties who benefit from the current situation, but other challenges such as flag state shopping or even "jurisdictional zone" shopping

[357] Ad Hoc Open-Ended Informal Working Group, *Letter Dated 30 June 2011*, 2011 (A/66/119), paragraph 6.
[358] Giovannetti, et al., *Beyond Borders: Global Biotechnology Report 2011*, 2011, p. 37. Recovering somewhat in 2010, expenditures grew by 2 per cent in the same regions.

could be reduced. Addressing these concerns and evaluating the capacity of regulatory options to spur innovation, as opposed to limiting it, is thus a highly pertinent objective.

Conservation, the second criterion, it is here understood as both *in situ* and *ex situ* conservation of biodiversity. As defined in the CBD article 2, *in situ* conservation is "the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings […]".[359] *Ex situ* conservation is the "conservation of components of biological diversity outside their natural habitats".[360] Ex situ conservation may for instance be keeping reproductive material in collections as a resource for research, or for reintroduction into the wild of endangered species. It should be reiterated here that CBD does not apply to ABNJ,[361] and it is far from obvious that the definitions of this Convention would prevail in a setting relating to the law of the sea. Yet, as the existing body of law relating to conservation in these areas is not associated with legally binding definitions, those of the CBD may serve as a reference point. Setting conservation of biodiversity as an objective when proposing regulatory options is pertinent when one considers the rapid on-going loss of oceanic biodiversity. Biodiversity is in itself, for instance in the CBD, generally recognised as an intrinsic value,[362] notwithstanding the enormous value it holds for humanity. Considering the potential, or lack of such, of any regulatory proposal to conserve biodiversity is thus a relevant exercise.

Sustainable use is a sub-notion of sustainable development. A generally accepted definition of sustainable development is that of the so-called Brundtland Report of 1987, which saw sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs".[363] Two key concepts are reflected; that of a present and future need, and that of limitations imposed by the current state of technology and social organisation on the environment's ability to meet

[359] CBD, article 2, paragraph 13.
[360] Ibid., article 2, paragraph 8.
[361] Its provisions apply in relation to each contracting party to areas within national jurisdiction and may only be extended to ABNJ as a result of flag state jurisdiction. See ibid., article 4(a) and (b).
[362] Ibid., preamble, paragraph 2.
[363] World Commission on Environment and Development, *Report of the World Commission on Environment and Development: Our Common Future*, 1987 (Annex to document A/42/427), part IV, paragraph 1.

both current and future needs.[364] There is disagreement among scholars as to the normative value of sustainable development as legal norm.[365] The idea of intergenerational responsibility, however, is well established and has been relied upon as early as 1893 in the Pacific Fur Seals Arbitration.[366] Sustainable *use* is understood here to be a limitation of the scope of the concept, from development in general to use of natural resources. For as Beyerlin and Marauhn point out, sustainable use only gains normative quality if linked with a specific object of use:[367] the CBD refers to the sustainable use of "biological resources".[368] Here, the object of use is marine biological material as the resource used in bioprospecting in the high seas. There is currently a need expressed by science, industry and others to use high seas biological material. The assumption is that there will also be such a need in the future. Ensuring the environment's capacity to serve these needs is thus of vital concern when outlining and assessing regulatory options. Sustainable use of marine biodiversity is closely linked to conservation in that their objectives both refer to environmental protection. But where conservation aims directly at the protection of the environment, sustainable use refers to the linkage between the need for environmental protection and human need to utilise nature. The need to utilise nature is also closely linked with the criterion, set out above, of spurring innovation. In this setting, sustainable use of marine biodiversity reflects the interconnectivity of conservation as a prerequisite for innovation through biotechnology.

Fairness refers often to general conceptions of what is just and morally right. On an international level, the concept of fairness often refers to the general North-South gap in development. In this case, fairness might, but not necessarily, refer to a gap between bioprospector and the involuntary bystander. In short, deeming something fair or unfair is often assumed to be a subjective exercise. Objectives of fairness are already present in

[364] Ibid.; Sands, *Principles of International Environmental Law*, 2003, p. 253.
[365] See Beyerlin and Marauhn, *International Environmental Law*, 2011, pp. 76-82.
[366] Sands, *Principles of International Environmental Law*, 2003, p. 256 citing *Moore's International Arbitration Awards*, 1893, p. 755.
[367] Beyerlin and Marauhn, *International Environmental Law*, 2011, p. 82.
[368] CBD, article 10. It further defines sustainable use as "the use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations", see CBD, article 2, paragraph 16.

UNCLOS, and its preamble is a useful indication in this respect. The preamble reflects the desirability of a legal order promoting "equitable and efficient utilization" of the oceanic resources.[369] As bioprospecting is utilisation of oceanic resources, an objective would be that this is done in an equitable and efficient manner.[370] Equitable utilisation can be an expression of fairness and suggests an equal level of access to the resources for researchers. One approach could be to consider this achieved by the current "first come, first served" situation, which is well in line with the fairness provided by the formal equality of access to the high seas, defended by Grotius.[371] UNCLOS also provides that this utilisation of resources shall be "efficient". This can express a utilitarian form of fairness, i.e. the fairness in a solution is judged by its potential to produce the maximum amount of goods. In this thesis, this objective is already present in the criterion of spurring innovation, set above.

So the question is whether there are other conceptions of fairness that must also be taken into account. The preamble recognises a just and equitable economic order, which takes into account the interest of mankind and the "special interests and needs of developing countries", be they coastal or landlocked.[372] A fair regulation would thus take into account these special needs and be constructed accordingly. This side of fairness can be further specified by way of inspiration from a Rawlsian perspective. In *A Theory of Justice*, Rawls launched the idea of justice as fairness.[373] Taking account of the utilitarian perspective, he used the social contract as a means of expressing how rational and mutually disinterested parties to the contract in would agree to certain principles of justice. Among these principles is the distribution of social and economic differences in a society is done so that the least advantaged parties achieve as the greatest benefits that the circumstances permit.[374] Though Rawls, it seems, did not himself apply his theory to the international

[369] UNCLOS, preamble, paragraph 5.
[370] On the justice in using GR, see Schroeder and Pogge, "Justice and the Convention on Biological Diversity", 2009.
[371] See above, section 2.2.1.
[372] UNCLOS, preamble, paragraph 6.
[373] Rawls, *A Theory of Justice: Revised Edition*, 1999
[374] Ibid., pp. 62-65.

scene without modifications,[375] this idea will serve as an inspiration when approaching what is fair when considering alternatives to the current legal regimes on an issue where benefits are unevenly distributed. To consider the fairness of policies is pertinent as a criterion in this context because it is a core objective to the concept of benefit-sharing itself. Concerning marine biological material, fairness has the potential to play an even greater part than in the CBD: under the CBD sharing the benefits that arise from utilisation of GR ideally entails a return of said benefits to a national or local entity in a provider country, thus creating an incentive to safeguard and conserve biodiversity.[376] Since there is no providing or conserving party in the high seas, it can be argued that ABS for the high seas has the potential to fulfil a function that is more redistributive of means and know-how, than it is conservationist. It should be added that any redistributed benefits might in turn be used for conservation purposes, so that a link may be established between fairness and conservation. Fairness is also related to the ability of a regulation to spur innovation because if objectives of fairness deter innovation, all stakeholders will be deprived of the benefits. A key task is therefore to search for options where objectives of fairness and new innovation conflict as little as possible.

Having set the potential for new innovation, conservation, sustainable use and fairness as the four criteria for the subsequent discussion, the next section will address challenges that are common to all ABS scenarios.

4.2. Initial remarks on challenges on the road to high seas ABS

Before policy-specific issues can be discussed in a meaningful way, certain challenges that are common to all proposals for high seas ABS should be addressed.

[375] Ibid., pp. 331-335; Rawls, "The Law of the Peoples", 1993.

[376] See COP4, *Adressing the Fair and Equitable Sharing of the Benefits Arising out of Genetic Resources: Options for Assistance to Developing Country Parties to the Convention on Biological Diversity*, CBD, 1998 (UNEP/CBD/COP4/22), p. 3. This link has been contested, see Simpson, "Biodiversity Prospecting: Shopping the Wild is Not the Key to Conservation", 1997.

4.2.1. Institutional and procedural options

No agency currently has a mandate that would allow imposing mandatory bioprospecting regulation for ABNJ. Whereas resources under national jurisdiction may be accessed through a contract or bilateral agreement stipulating the terms of *quid pro quo*, access to biological material in ABNJ is open. In these areas, there is no party that grant access to the high seas. Benefit-sharing obligations would have to take the form of self-imposed obligations through flag state jurisdiction.[377] Equally no recipient is immediately entitled to these benefits. A strictly contractual or bilateral approach therefore presents inherent weaknesses, as one of the parties, the provider, is missing.[378] An initial step would be to agree upon the aptness of a multilateral approach. Neither bilateral nor contractual ABS solutions for the high seas appear to be proposed alternatives in on-going discussions.

Some form of institutional entity or agency would be required to be in charge of, or associated with, a multilateral approach. The question is what sort of entity this could be. Traditionally, the concept of ABS belongs to the realm of areas under national jurisdiction.[379] Merging this concept with the regime of the high seas requires finding an apt institutional anchorage. This is a challenge that will have to be addressed by stakeholders advocating a change to the status quo.

A possible institutional avenue is that of a regional approach to high seas ABS. Regional agreements that also cover ocean areas beyond national jurisdiction are important tools for the safeguarding the environment and biodiversity beyond the EEZ.[380] RFMOs or frameworks like the OSPAR Convention may serve as examples. Regional agreements present certain characteristics that should be noted here. First of all, vast parts of the high

[377] This possibility will be explored below, see section 4.3.3.

[378] See Matz, "Marine Biological Resources: Some Reflections on Concepts for the Protection and Sustainable Use of Biological Resources in the Deep Sea", 2002, p. 292.

[379] See CBD, article 15, which establishes the that the authority to determine access to GR rests with national governments and is subject to their legislation, while obliging states to take measures to share benefits arising from the commercial utilisation of these GR. See also article 4 concerning the jurisdictional scope of the convention.

[380] For an introduction to the most important regional treaties and their importance in protecting marine ecosystems, see Warner, *Protecting the Oceans Beyond National Jurisdiction: Strengthening the International Law Framework*, 2009, pp. 173-205.

seas are not covered by regional agreements. Placing ABS obligations on specific regions may discourage bioprospecting in that area and thus not spur innovation. Also, ABS obligations fall upon only signatory states and not third parties, which may prevent effective implementation of ABS policies. Furthermore, the justification for ABS as a means to fairness is less present in a regional context than a global one, as national wealth often is more evenly distributed among parties to a regional agreement than they are at the global level. For these reasons, regional agreements offer less potential for hosting ABS regulation of the high seas than a global approach.

One could conceive an institutional framework connected to the sector that the invention leads to, i.e. the end of the production line. Possibly, benefits from alimentary and agricultural inventions deriving from high seas biological material could be dealt with under the auspices of the FAO. A sectoral approach does present certain drawbacks. The sector in which an invention finds its use can be arbitrary and overlapping. To have legal obligations depend on results found only at a later stage in the bioprospecting process does not provide bioprospectors with legal clarity. As predictability is an important factor for investing in bioprospecting, a sectoral approach may induce disincentives to innovate. Furthermore, these disincentives could be unevenly distributed. For instance, if an active compound was identified and a potential application was found in a sector with benefit-sharing obligations, it could be tempting not to invest further in developing the application in that sector. In this scenario, it could prove better for industry to explore whether the compound could find application in another sector that is not regulated by benefit-sharing obligations. This argument would not be valid if either ABS is seen by the industry as positively business-friendly, or unless all sectors were regulated. Both these scenarios currently seem hard to realise fully. Other difficult questions would arise, such as what should be considered a sector or whether it is rational to entrust a number of institutions with quite similar work tasks. To sum up, a sectoral solution may prove contrary to the objective of spurring innovation. The sectoral approach seems not to be on the table in on-going discussions.

Another possible institutional haven for ABS policies for biological material in the high seas may be that of the CBD. This would involve entrusting some sort of institutional body, existing or to be created, with a role in connection with a CBD COP decision, Nagoya MOP decision, guidelines, or a new protocol.[381] With a view to conserving biodiversity and promoting sustainable use, this institutional option has certain advantages. Conservation and sustainable use of biodiversity in ABNJ are recognised objectives under the Convention: contracting parties have a general obligation to cooperate "in respect of areas beyond national jurisdiction" for the conservation and sustainable use of biodiversity.[382] Since 1992, expertise in this area has developed within the bodies of the CBD. Building upon the ideas set forth in NP article 10, one might imagine parties to the Protocol negotiating a global multilateral benefit-sharing mechanism which, either exclusively or as a part of a larger package deal, addresses high seas genetic resources. However, any agreement reached in this forum, will in all likelihood be without the participation of the biggest biotech state, namely the United States.[383] On the other hand, this state is neither a party to UNCLOS nor does it seem to express any sympathy with the concept of ABNJ benefit-sharing, [384] which decreases the relative value of this argument. Of greater importance is the lack of institutional roots in the CBD to high seas governance that surpass the general principle of cooperation found in article 5 and the possibilities awarded by flag state jurisdiction through article 4. Legally, nothing stands in the way of taking the CBD as a starting point for high seas ABS, as long as the policies are in conformity with the law of the sea. [385] This may, however, be perceived as presenting logical, or almost methodological, impediments. It may contradict the perception of UNCLOS as "the legal

[381] See Greiber, *Access and Benefit Sharing in Relation to Marine Genetic Resources from Areas Beyond National Jurisdiction*, 2011, p. 34. He argues against CBD-associated organs hosting a global multilateral benefit-sharing mechanism.
[382] CBD, article 5.
[383] The United States signed the CBD in 1993, but it was never ratified. UNCLOS and the Implementation Agreement Relating to Part XI were sent to the American Senate in 1994, where ratification was rejected. For the comparative dominance of the United States in biotechnology, see Giovannetti, et al., *Beyond Borders*, 2011.
[384] Chiarolla, et al., *Marine Biodiversity Working Group Highlights: Tuesday, 8 May 2012*, 9 May 2012.
[385] CBD, article 22(2) provides that parties shall implement the convention "with respect to the marine environment" consistently with the law of the sea.

framework within which all activities in the ocean and seas must be carried out".[386] As noted by Greiber, joining a CBD-based global benefit-sharing mechanism could be interpreted as forum choice, and subsequently disconnect UNCLOS from ABS related to marine genetic resources in ABNJ.[387] This could be detrimental to the role of UNCLOS of protecting the marine environment from all harmful human activities, and thus run counter to the objective of conservation and sustainable use.

Applying the CBD concept of benefit-sharing to the "Constitution for the oceans" and an UNCLOS framework could prove more fruitful. An institutional path starting from an UNCLOS offset could ensure greater uniformity and integration with existing rights and obligations. It could also prove beneficial to conservation and sustainable use of biodiversity if synergy effects are attained from future purely environmental regulation of the high seas, such as MPAs.[388] There is also a potential for synergies between future UNCLOS-related regulation and the global multilateral benefit-sharing mechanism envisaged in NP article 10. As established above this mechanism has a wider scope of application than merely the high seas, as it refers to utilisation of GR in "transboundary situations" or where "it is not possible to obtain prior informed consent".[389] Depending on the specific scenario, ABS for high seas biological material under UNCLOS could in fact contribute to realising the fair distribution of benefits and the objectives of conservation envisaged in the NP article 10 and in the CBD.

Theoretically, the issue of introducing a form of ABS regulation in an UNCLOS setting could be done by way of amending the treaty. According to article 312, amendments other than those relating to the activities in the Area may be proposed and a conference may be requested. The proposition shall be forwarded to all state parties. If, after a year, at least half of the all parties have responded favourably to a request, the Secretary-General shall

[386] United Nations General Assembly, *Oceans and the Law of the Sea*, 2011 (A/RES/66/77), preamble, paragraph 4.
[387] Greiber, *Access and Benefit Sharing in Relation to Marine Genetic Resources from Areas Beyond National Jurisdiction*, 2011, p. 34.
[388] Benefits could for instance help fund MPAs or research undertaken in MPAs.
[389] NP, article 10.

convene a conference.[390] The main procedural way indicated in the provision for passing an amendment is by way of consensus. Concerning such a doubly controversial issue as both ABNJ regulation and ABS, consensus among parties to UNCLOS seems highly unlikely.[391]

A hotter topic, and a procedure that does not require consensus, is that of a new implementing agreement to UNCLOS. Several NGOs and scholars have advocated a new implementing agreement.[392] Certain parties, such as the EU, also suggest that the mandate of the Working Group be amended in view of launching negotiations on an implementing agreement.[393] A new agreement holds great promise, such as the potential to take into account the inadequacies of the current law of the sea and adopt holistic and modern environmental governance of the high seas. More specifically, an implementing agreement could assure the conservation of oceanic biodiversity and lead the way for substantial provisions regulating their sustainable use. Concerning bioprospecting, the potential is two-fold: firstly, it would be an opportunity to address the problems encountered by deep sea cruises as to the legal status of biological material of the Area.[394] This legal clarity could in turn help encourage research and innovation. Secondly, a new implementing agreement provides an opportunity to render effective the existing technology transfer obligations of UNCLOS and thus promote fairness in the exploitation of high seas biological material. It should be noted that an ABS regime, resembling either that of the CBD or that of the ITPGRFA, is a potential, though far from evident, ingredient in such an implementing agreement. Oceanic life is confronted with a variety of great and imminent threats to its diversity. A possible scenario is that even its most ardent proponents would drop the controversial issue of benefit-sharing in order to solve other issues, thought to be more important. These are considerations that are closely related to the discussions on modalities of ABS options, which will be discussed below. In the context of an UNCLOS-associated

[390] UNCLOS, article 312(1).
[391] See Greiber, *Access and Benefit Sharing in Relation to Marine Genetic Resources from Areas Beyond National Jurisdiction*, 2011, p. 47.
[392] See Hart, *Elements of a Possible Implementation Agreement to UNCLOS for the Conservation and Sustainable Use of Marine Biodiversity in Areas Beyond National Jurisdiction*, 2008.
[393] Chiarolla, et al., *Summary of the Fifth Meeting of the Working Group on Marine Biodiversity Beyond Areas of National Jurisdiction*, 14 May 2012.
[394] See above, section 2.2.4. An implementation agreement is less likely to resolve the practical difficulties of distinguishing the biological resources of the continental shelf from those of the high seas.

process, the structure and size of this entity would depend on how states perceive benefit-sharing. If benefit-sharing is viewed as the exchange of scientific knowledge, thus providing one form of fairness, a secretariat with the responsibility for administering an Internet platform may suffice.[395] The current online bioprospecting information resource maintained by the United Nations University may serve as an example here.[396] A modest institutional option could also be a clearing-house mechanism that receives notification of scientific research and ensures the further distribution of data.[397] If an ABS-system resembling that outlined in NP article 10 were envisaged, a larger structure could be required. As pointed out by Matz-Lück, full resource management, including scientific experts, compliance control and decision-making bodies, would require a permanent institution, and the question of legal personality would also have to be addressed.[398]

A candidate for the position of institutional umbrella for ABNJ ABS is already present within the Convention. The International Seabed Authority, seated in Jamaica, is in charge of administering the mineral resources of the Area in accordance with principles set forth in part XI. The idea of seabed mineral resources as common heritage of mankind and the provisions on technology transfer can be seen as founded on objectives that reflect the "fairness" sought by ABS proponents. Additionally, the fact that the ISA is an already existing institution is a core argument for the ISA assuming the role of managing a future ABS regime for the high seas. It is most commonly evoked in relation to an expansion of its mandate to include the biological resources of the Area. But it could also be associated with bioprospecting in the water column above. As noted in a EU working paper, the ISA may also be put in charge of managing a *sui generis* system, thus avoiding fragmentation of international agencies, while benefiting from existing structures and expertise and

[395] Matz-Lück, "The Concept of the Common Heritage of Mankind", 2010, p. 68. Her institutional proposals concern management of the living resources in the Area.
[396] United Nations University. *Bioprospecting Information Resource* [online database]. <www.bioprospector.org/bioprospector/>. The database publishes known information on research and commercialised products arising from bioprospecting in the four categories of Antarctic, Pacific, Marine and Arctic bioprospecting.
[397] Matz-Lück, "The Concept of the Common Heritage of Mankind", 2010, p. 69.
[398] Ibid., p. 68.

increasing the activities of an underused body.[399] Politically, however, this scenario may prove exceedingly hard to realise, given the difficulties that arose relating to the resources of the Area when UNCLOS was adopted. As seen above, the controversy regarding the "common heritage of mankind" still remains. Another alternative for ABS proponents is to advocate for the creation of a separate institution that has less ideologically controversial baggage. Whether this strategy is fair, is another question. Developing countries can argue that history so far has cheated them of the fervently fought for benefits of the common heritage regime, as mineral prospecting has yet to prove commercially lucrative. De la Fayette considers that if delegates negotiating UNCLOS had known about the economic potential of genetic resources when the Convention was negotiated, surely they would have included them in Part XI.[400] Amending or interpreting the regime of the Area to apply to biological material on the ocean floor, seabed and the water column above could in that regard be a fair redress of fate's irony. Nevertheless, this scenario remains politically difficult and can inhibit progress on the issue.

A less controversial platform for high seas ABS could also be created in the future. In 1992, the UN Conference on Environment and Development (UNCED) convened in Rio de Janeiro, Brazil. With the objective of striking a balance of environmental protection and economic development, the conference adopted several important, yet non-binding, documents, such as the Rio Declaration on Environment and Development and the action program Agenda 21.[401] Following the Conference, the UN General-Assembly established the Commission on Sustainable Development, whose task includes the monitoring of environmental and development goals in the UN system and overseeing the implementation of Agenda 21.[402] Marking the twentieth anniversary of the conference, states will meet again in June 2012 in Rio for the United Nations Conference on Sustainable Development,

[399] Council of the European Union, *Reflections on the Management of Genetic Resources in Areas Beyond National Jurisdiction (Background paper 12)*, European Union, 2006 (11510/06 ADD 12), p. 9. See also Matz-Lück, "The Concept of the Common Heritage of Mankind", 2010, pp. 72-73, who favours this option for biological resources in the Area, but recognises its unlikelihood.

[400] De la Fayette, "Institutional Arrangements for the Legal Regime Governing Areas Beyond National Jurisdiction – Commentary on Tullio Scovazzi", 2010, p. 77.

[401] See Sands, *Principles of International Environmental Law*, 2003, pp. 52-69. Equally, both the CBD and the UN Framework Convention on Climate Change were opened for signature at UNCED.

[402] See Kiss and Shelton, *Guide to International Environmental Law*, 2007, p. 50.

the so-called Rio+20 Conference. Oceans are one of seven key topics that have been highlighted in the preparations to the conference.[403] Also during the preparations for the conference, over half of the states attending an intercessional meeting held in December 2011 had addressed the oceans in their submissions, thus indicating that parties wish for oceanic issues to figure prominently at the Conference.[404] At the same time, deeming the current institutional situation for environmental law inadequate, several states are now calling for the establishment of a World Environment Organisation. *Inter alia*, this was one of the high-level political messages to Rio+20 from the Governing Council of United Nations Environment Program.[405] Similar calls are heard from environmental lawyers and NGOs.[406] Less ambitious institutional reforms are certainly also on the table.[407] Irrespective of whether institutional issues are substantially treated among the many issues to be discussed at Rio +20, these proposals show that institutions preoccupied with oceanic governance may also be created outside CBD and UNCLOS. Concerning this currently completely hypothetical situation, not many remarks can be made on the potential of such institutions to spur innovation or to provide fairness. A link to sustainable use and conservation, however, seems a likely outcome if ABS for the high seas were connected to such institutional approaches in the future.

Finding the appropriate forum is a task that cannot be circumvented. Whether the entity builds upon the CBD, UNCLOS or other instruments, the characteristics of such an entity would depend on the rights and obligations proposed. And herein lies a still greater challenge: determining the possible modalities of ABS regulation for the high seas. Now, one such material issue, common to all ABS proposals for the high seas, will be discussed.

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[403] United Nations Conference on Sustainable Development, *Rio 2012 Issues Brief no. 4: Oceans*, UNCSD Secretariat, 2012.

[404] Powers, "Crafting a Consise Outcome", 2012, p. 9.

[405] Governing Coucil of the United Nations Environment Programme, *Proceedings of the Governing Council*, 26th session of the Governing Council/Global Ministerial Environment Forum, 24 February 2011 (UNEP/GC.26/19), p. 75. Some delegations preferred establishing a World Environmental Organization, others favoured changing UNEP's mandate, while yet others preferred a combination of these two options.

[406] See e.g. Centre International de Droit Comparé de l'Environnement, *Appel des Juristes et des Associations de Droit de l'Environnement*, 28 October 2011, pp. 71-73.

[407] Covino-Kerpelman, "Regional Preparations for Rio+20", 2012, p. 14. She cites propositions such as the creation of a Sustainable Development Council to subsume the Commission or the establishment of ombudspersons for future generations.

4.2.2. Triggers for benefit-sharing

If an ABS system is to be envisaged, the benefit-sharing has to start at some point. An invitation or an obligation to share benefits will have to be triggered at a certain stage of the prospecting or at subsequent stages. This entails a search for apt actions or moments in time that trigger an invitation or obligation to share. For the case of voluntary benefit-sharing, i.e. an invitation to share benefits, identifying triggers is useful, but less pressing than for mandatory solutions. In this discussion, emphasis is therefore put on the triggers for a mandatory policy option.

Identifying triggers will likely require a choice to be made with respect to the question of distinguishing pure and applied research, either by choosing triggers that only come into play for applied sciences and leave the pure sciences alone, or by opting for triggers that do not differentiate fundamental from applied sciences, thus avoiding the problematic distinction.

When searching for a trigger, one possibility is opting for initial moments, such as when a research entity has established that it wishes to conduct a cruise. The question is what the implications would be if this early moment is chosen for triggering obligations. At this moment, the composition and intentions of bioprospectors vary. Some start out as purely academic, taxonomical missions, and their discoveries are only later used for commercial purposes, or the material is transferred to *ex situ* collections and later developed by other persons. If the aim is to make obligations fall only on commercially oriented bioprospecting, obligations are likely to only to be applicable where a commercial intent is already present and where this intent is divulged. If obligations are unevenly distributed among the same group of persons, there is a risk that the result would be unfair and create unbalanced incentives. Compared to cruises where the commercial application is discovered years later, obligations would be unevenly distributed. Commercial funding of new cruises could then be less lucrative than further research on existing collections, thus providing a disincentive to innovation. If the aim is to make no distinction of pure and

applied sciences, it should be noted that no benefits have been created at this moment. Especially if the obligation takes the form of monetary benefits, this trigger would in reality not result in benefit-sharing, but merely be a tax placed upon an intention to research. The only real alternative under which this moment can be considered as a trigger is for obligations to let scientists from disadvantaged states participate in the research. This scenario resembles the legal right of coastal states to participate in MSR undertaken by other parties in the EEZ and the continental shelf.[408] This trigger may not necessarily discourage innovation, but modality questions of who should be able to participate would have to be addressed.

Another option is to make these initial moments trigger suspended obligations applicable to all, rather than substantive obligations. Initial action could trigger a duty to notify the institutional entity of a planned cruise. The system established for MSR in the EEZ or on the continental shelf of a foreign state can serve as a model here. According to UNCLOS article 248, states that intend to undertake MSR in these areas shall, "not less than six months in advance" of the start of the project, give information to the coastal state on the nature of the project, the methods employed, and the geographical area where research will be undertaken. A system of implied consent on certain conditions is established, and permission is the norm rather than the exception.[409] A similar notification to the institutional entity could be constructed for the MSR in the high seas. Some modifications would be required, such as the time frame for prior notification. The absence of interests of coastal state sovereignty in the high seas would perhaps not warrant as much as six months prior notice. Nor does there seem to be any reason for the entity to deny access, given the principle of MSR as a high seas freedom. If combined with a duty to divulge scientific methods employed or environmental impact assessments, it may be beneficial to the conservation of biodiversity and to ensure the sustainable scientific use of marine resources. The provisions of CCAMLR could be a basis for ensuring a sound interplay of

[408] UNCLOS, article 241(1)(a).
[409] Ibid., article 252. For an empirical study of denials and clearances for MSR in different states, see Gorina-Ysern, *An International Regime for Marine Scientific Research*, 2003, pp. 184-190.

resource exploitation and conservation.[410] A notification system would also provide insight as to the number and nature of current research projects, information that is currently fragmented.[411] Such information could also provide a basis for sound decision-making, which presumably would be beneficial to the conservation and sustainable use of biodiversity. A notification system has the potential not to discourage innovation if notification is a simple and cost-efficient procedure, perhaps in the form of a standard formulary. Notification in itself would not require establishing a specific commercial or non-commercial intent. As such, innovation through research remains a high seas freedom, but would be subject to a procedural requirement. Besides providing information and promoting sustainable use, notification could allow for further subsequent benefit-sharing, pending a possible commercial application. Interesting as the idea of suspended obligations is, a new trigger would have to be found for prompting substantial benefit-sharing obligations.

A possibility is to opt for the very first step of actual bioprospecting, the action of sampling. This would correspond with how access is usually seen as the action triggering benefit-sharing under the CBD article 15.[412] This action as a trigger is confronted with the same drawbacks as substantial benefit-sharing starting at moments prior to the cruise. As benefits have yet to be created, it would be a disincentive to innovation if unfruitful cruises end up not only having to cover the cost of the cruise, but also some sort of transaction or obligation to another party. There are of course less extreme scenarios where exceptions may be created for cruises later proving unsuccessful. Yet the difficult criterion of intent is equally problematic at this moment in time, and is, as indicated above, likely not to provide a regulation that applies to researchers in fair, equal and predictable manner. For these reasons, the moment of sampling presents with important drawbacks as a trigger for obligations. On the other hand, if no distinction of pure from applied research is made, and

[410] See above, section 3.4.1.

[411] For an overview of some of the larger, known projects, see Arico and Salpin, *Bioprospecting of Genetic Resources in the Deep Seabed*, 2005, pp.16-19.

[412] See Tvedt and Young, *Beyond Access: Exploring Implementation of the Fair and Equitable Sharing Commitment in the CBD*, 2007, pp. 58-62. The authors argue that benefit-sharing trigger under the CBD could more usefully be seen as the moment of "utilization" of GR rather than the moment of access.

obligations fall on both pure and applied sciences from the sampling moment, it could represent a step away from article 87 of UNCLOS and the MSR regime. The magnitude of the change required and the compatibility of new regulations with the existing framework would depend on what obligation actually is placed upon the bioprospectors.

A later moment that can be considered for triggering substantive ABS obligations is when the biological material is utilised. Synthesising DNA from biological material or making new modified organisms can be examples of such utilisation.[413] Young and Tvedt note that this trigger is externally verifiable, and they suggest several approaches to how it can be further determined.[414] Retained here is that utilisation can be categorised by stage of development from collection to product development.[415] As stated above, the action of collecting presents drawbacks as a trigger. The exact demarcation for later actions would thus have to be determined. If the intention is for high seas ABS is to leave pure MSR untouched, such actions could be associated with commercial use.

For instance, triggering actions could be the granting of a patent. This action would both provide a clear point of demarcation for commercialisation, even though historically non-commercial actors, such as universities, are increasingly seeking patent protection.[416] This moment indicates that new knowledge has been found, and that non-monetary benefits have been created at this point. This makes this action a possible candidate for triggering non-monetary benefits. Whether this trigger otherwise spurs innovation, promotes conservation and sustainable use, or is a fair option depends on the form of benefit-sharing chosen.

Concerning monetary benefits, a granted patent does not indicate that any economic benefit has been gained, as the entry into market of an invention may lie many years ahead.[417] If

[413] Ibid., p. 59.
[414] Ibid., pp. 66-68.
[415] Ibid., p. 67.
[416] See above, section 2.1.2.3.
[417] Salpin and Germani, "Patenting of Research Results Related to Genetic Resources from Areas beyond National Jurisdiction", 2007, p. 16.

obligations were triggered before revenue is gained, bioprospectors and industry would have to factor in yet another cost to the already risky investment. This can be seen as taxing risk taking. The effect this may have on the willingness to explore and innovate is hard to assess, but it can be assumed that some view such a trigger as a disincentive to innovation. A related option may prove more apt to spur innovation: the filing of a patent application or the granting of a patent could trigger a suspended obligation, and a signal to the relevant institutional entity that benefit-sharing obligations may occur at a later stage. As suspended obligations go, this option offers fewer possibilities of a synergy effect on conservation and sustainable use of biodiversity than the notification option discussed above.

A later triggering moment could for instance be when the revenues from a commercial application exceed a particular sum or when the application has been on the market for a particular period of time. This would require patience in relation to some of the inventions. In terms of incentives, it can be assumed that as time passes after the moment of access, the sense of entitlement to the product grows and sharing the benefits will seem less and less natural in the eyes of the holder. The situation is somewhat similar to that of the ITPGRFA seen above. Several years may pass from the sampling until a product is launched. This is of particular relevance for the pharmaceutical industry where extensive trials are required. Uncertain but recurring indications estimate that it may take up to 15 years to develop a product in this sector.[418] The advantage of setting a particular gross net sum as a trigger is particularly relevant with regards to the fair treatment of unsuccessful or semi-successful bioprospecting enterprises: an obligation does not occur unless benefits truly have arisen. If not, there seems to be little reason to adhere to a redistributive objective. On the other hand, it can be argued this it is a form of burden placed upon success, which would discourage the considerable investments needed for this particular form of innovation. This can be amended to a certain extent by opting for forms of benefits other than monetary benefits, such as the sharing of knowledge or information on samples.

[418] See e.g. Smagadi, *Medicinal Bioprospecting: Policy Options for Access and Benefit-Sharing*, 2009, p. 39.

4.3. Possible modalities of an ABS regime for bioprospecting

In the following, a few of the multitude of possible modalities of an ABS regime are examined. They will be explored in an order tentatively moving from what may be characterized as the most comprehensive approaches to the less comprehensive and softer approaches.

4.3.1. A global multilateral benefit-sharing fund

One option is to view benefit-sharing as monetary. If a mechanism is multilateral, this could take the form of a fund that serves as focal point and administers the monetary transactions. Monetary sharing could comprise both payments and legal positions that can be of financial value to its holder, such as co-ownership of IPR or licensing rights.[419]

First, for the case of a scenario where money is transferred to a fund, one question is whether contributions from bioprospectors or subsequent product developers should be mandatory or voluntary. If voluntary, contributions to the fund would depend on the inclinations of bioprospectors, industry and other possible contributors. A voluntary system has the advantage of not creating disincentives to innovate. On the other hand, there is a risk that it would simply not be used, and that there would be only limited or symbolic funds available for the promotion of innovation, conservation and sustainable use. Clearly, an empty fund would no impact in achieving fairness. For a voluntary fund model to be functional, there would have to be incentives for parties to contribute.

If mandatory, benefits would have to come into such a fund depending on the triggers for benefit-sharing as discussed above. Because monetary benefits are usually associated with commercial research and not basic research, knowing when fund contribution is warranted should be associated with commercialisation, as utilisation as a trigger provides no indication of monetary benefits having been created. In order to promote innovation, legal predictability identifying relevant persons and circumstances should be established. This

[419] See NP, Annex 1(1).

means that an end point must also be set for obligations.[420] An important and difficult question that arises is how far away from the original sampled material the benefit-creating process can go before participation in a fund model is no longer necessary.[421] The answer is somewhere between two extremes of any use of knowledge that has been acquired at any point as a result of the material, and the direct use of a sampled organism. Effective implementation of any such attempt to set a limit could involve relying on the patent system. This would likely require resolving of the controversial issue of disclosure of origin in patent applications.[422] Resolving this issue in a manner perceived as not providing a disincentive to innovation may be an important practical barrier to a functioning global multilateral fund. In order to avoid conflict with the rights awarded by a patent, the monetary contributions must be made independently of the patent itself. Concerning the size of contributions obligations should remain relatively modest in order to avoid strain on innovation. On the other hand, for benefit recipients to be able to perform conservation initiatives or create innovation, the obligations should not be too small.

If one assumes, as above, that possible obligations fall upon patentees with commercially successful invention and only these, mandatory obligations would have to be supervised to ensure compliance. Presumably, there would be a need to keep track of the success and gains for each patented product or general portfolios of high seas biological material, in order to distribute benefits. There is a risk that this will be perceived as creating bureaucratic strain on innovation.

If cost-efficient reporting solutions are found, a next question is who shall be at the receiving end for monetary benefits. This question arises both for a mandatory and voluntary fund model. There are many possible worthy beneficiaries that could be envisaged for the conservation of biodiversity. Given the lack of investments in high seas

[420] Drankier, et al., "Marine Genetic Resources in Areas Beyond National Jurisdiction", 2012, p. 385, drawing this less; Young and Tvedt, *Balancing Building Blocks of a Functional ABS System*, 2009, pp. 23-24.
[421] This thought draws inspiration from Young and Tvedt, *Balancing Building Blocks of a Functional ABS System*, 2009, p. 24.
[422] See generally Hoare and Tarasofsky, "Asking and Telling: Can “Disclosure of Origin” Requirements in Patent Applications Make a Difference?", 2007; Tvedt, "Elements for Legislation in User Countries to Meet the Fair and Equitable Benefit-Sharing Commitment", 2006, p. 204.

conservation and protection of marine environment over decades, recipients dedicated to the oceanic realm are likely candidates. Theoretically, however, one may even imagine that a high seas ABS system could contribute to mainland conservation of biodiversity and even counter the practical shortcomings of benefit-sharing in the CBD.

For emphasis on conservation of the marine environment, a fund may transfer benefits to states, regional entities, international organisations or NGOs who propose specific conservation projects, such as the establishment of MPAs. Funding could be awarded to research institutions for hard science projects on issues relating to loss of oceanic biodiversity, ocean acidification or bio-remediation, such as the capacity of the oceans to store CO2 or other projects that that may help researchers understand the many mysteries that still exist regarding microorganisms in seas. There are several examples of promising research that may prove important in order to tackle climate change, for instance by using oceanic biological material for the production of bio-fuel.[423] Reducing carbon emissions and subsequently ocean acidification would preserve a larger segment of biodiversity in the oceans. In such a scenario, benefit-sharing from bioprospecting would constitute a payment for the ecosystem services provided by the oceans to the whole of humanity. In short, distribution of monetary benefits could be used to preserve biodiversity, encourage sustainable use, and be a fair option. It could also represent an incentive to conduct certain types of research rather than others. Yet, this would be a form of subsidising, which may go counter to the general objective of spurring innovation. The relevance of the subsidy argument depends on the faith accorded to free market mechanisms to also advance research in fields where economic gain may be uncertain. One might also interject that it would be fairer and more sustainable to establish subsidising obligations on less conservation-friendly resource exploitation, such as fossil fuels, rather than on low-impact resource exploitation that may lead to advances in fields such as pharmacology or food production.

[423] See generally Alper and Stephanopoulos, "Engineering for Biofoels: Exploiting Innate Microbial Capacity or Importing Biosynthetic Potential?", 2009.

A related option that emphasises fairness would be to consider monetary benefits as co-ownership to IPR. For instance, given increasing tendency of western universities and public research centres to seek patent protection of their research results, a possibility is to target these users of biodiversity for particular benefit-sharing measures. Compulsory co-ownership of IPR would not be compatible with the fundamental exclusivity of the rights awarded to the patentee by a patent.[424] For this reason, a mandatory model is not an option. On the other hand, the fund could invite universities to share ownership of these patents with colleagues in disadvantaged states.[425] Depending on how general or limited the scope of recipients is made, this option could provide a way of rendering efficient the UNCLOS provisions on technology transfer of Part XIV. This could provide for innovation being spurred with the participation of a greater part of the scientific community. The drawback is that, if perceived as a burden placed upon universities, there is a risk that the universities may become less attractive as partners for cooperation with industry. This would in turn be contrary to the overall objective of increased innovation.

To sum up, there is no doubt that there are many possible recipients of means from a fund model that could promote the four criteria set forth here. It is hard, however, to get around the counter-argument that monetary benefit-sharing can provide disincentives to innovation. This is especially the case for mandatory solutions. These options are also confronted with important challenges of designating whom obligations shall fall upon, and in which circumstances.

4.3.2. Sharing non-monetary benefits: common pool for biological material

Non-monetary benefits may include, among other forms, sharing of research results, cooperation in scientific research and admittance to *ex situ* facilities or databases.[426] One option that takes these alternatives into account is the establishment of a common pool for biological material retrieved from the high seas and possibly from the Area and other parts

[424] See above, section 2.1.2.2.
[425] This option could also be realised without the intermediary of a fund, see below, section 4.3.3.
[426] NP, Annex, article 1(2).

of the sea.[427] This idea is related to the idea of an open source approach, developed in the world of computer programming and software world.[428]

Biological resources *in situ* in the high seas are common pool resources. After collection and appropriation, biological material may be held in private collections[429] or deposited in an exclusive manner such as under the Budapest Treaty. If a common pool is established for material retrieved by bioprospecting, the main difference from such known approaches is in the conditions of access for third parties. The general idea is that benefits retrieved from the high seas would be deposited in a public trust entity and made available to others in a non-exclusive or partially exclusive manner. Hence, third party access would constitute the benefit-sharing. Benefits would then take the form of the sharing of knowledge and information with to those who seek such knowledge. This solution would constitute a benefit-sharing mechanism based on the needs of the scientific community and others.[430] It also offers a way of meeting the requirements of UNCLOS article 244 on publication and dissemination of research results despite a patent being granted, e.g. on a microorganism.

This form of sharing would provide researchers with the ability to access deposited material or information and further study these. In turn, this would further scientific knowledge, which would be beneficial to innovation, at least as regards basic scientific research. It would provide equal opportunity of all to access to the material, even though only a few have the means to collect it. This makes it an option that promotes fairness. A common pool idea holds no inherent North-South fairness, but the added value of such access would presumably be greater for scientists from states with less developed structures

[427] Greiber, *Access and Benefit Sharing in Relation to Marine Genetic Resources from Areas Beyond National Jurisdiction*, 2011, pp. 36 and 46-47; Tvedt, *Common Pool in Aquaculture – Sui Generis and Other Options for Benefit Sharing*, 2011.

[428] On the development of the open source movement, see e.g. Mandrusiak, "Balancing Open Source Paradigms and Traditional Intellectual Property Models to Optimize Innovation", 2010, pp. 313-316.

[429] For instance the pharmaceutical company Pharmamar has a library of one hundred thousand marine organisms, that the company and potential partners can enjoy, see Pharmamar, *Partnering*, 2012, <www.pharmamar.com/partnering.aspx>.

[430] Greiber, *Access and Benefit Sharing in Relation to Marine Genetic Resources from Areas Beyond National Jurisdiction*, 2011, p. 36.

of inter-institutional cooperation. Also, such a common pool could be associated with capacity building initiatives.

Concerning the input into such a common pool, there are two main possibilities. The first is the deposit of raw material, e.g. samples of microorganisms. This is a method known from private collections or the Budapest Treaty. This option can help conserve biodiversity ex-situ.[431] For material deposits to reach the intended objective of fairness, a decentralised deposit system may be more efficient than a centralised option. Here, the functioning of CGIAR centres may serve as an example.[432] Whether this is feasible would have to be considered having regard to cost-efficiency.

The second option is that a common pool is composed of processed data relating to the biological material, but not samples of the material. In particular, the pool may consist of sequencing data of sampled species. This option is also grounded on known methods and procedures. The GenBank sequence database could serve as an example of an open access database containing vast amounts sequencing data of organisms available to researchers.[433] Available sequencing data as a form of benefit-sharing may disseminate knowledge fairly and irrespectively of where the recipients are located. The advantages in terms of conserving biodiversity are more indirect than the case indicated above for deposit of material.

A question that would have to be addressed for both sample deposits and sequencing deposit solutions is whether it should be a mandatory or voluntary option. The dilemma of voluntary versus mandatory is the same as for the fund option: a voluntary solution would not put more strain on industry and researching entities than they see fit, yet a voluntary mechanism risks not being used.

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[431] Potentially, but controversially, it could be used as a means reintroduce endangered species into the wild. Given the vastness of the ocean, how useful such reintroduction is would have to be evaluated along with the considerations of ecological impacts of reintroduction in general.

[432] See above, section 3.3.1; Brahy and Louafi, *The Role of the Research Sector in ABS Governance*, 2007, pp. 9-12.

[433] See National Center for Biotechnology Information. *GenBank* [online database], 2011. <www.ncbi.nlm.nih.gov/genbank/>.

Yet, a voluntary mechanism offers advantages of flexibility. A voluntary mechanism may more easily allow for collaborations with existing private collections or sequencing databases than the mandatory option: If these holders of resources consider cooperation beneficial, synergies may take the form of allowing access to material that would otherwise not be available. It would take the form of a voluntary retro-activity of an ABS policy.[434]

Voluntary solutions can open up for deposit of biological material from entities other than researching vessels and bioprospectors, who also may acquire biological material during the course of high seas activities, such as mining operators or offshore drilling companies. Activities that have potentially damaging environmental repercussions[435] could then contribute to preserving some of the biodiversity they put at risk. The geographical scope of a voluntary common pool may also be extended to bioprospecting or other activities undertaken in other zones, such as in the EEZ, continental shelf or the territorial sea. Open access to such material, which would otherwise remained closed, could be beneficial to promoting fairness and innovation.

If mandatory, obligations to contribute could be prompted by the suspended obligation of prior notification, and substantive obligations triggered for instance by the "utilisation" which would have to be given a specific definition. If funding for bioprospecting is to be secured, the relationship to IPR has to be taken into account. Because an invention must be novel and involve an inventive step in order to meet the requirements for patentability,[436] information that discloses the invention can in most cases not be made public knowledge before the application is filed. If the material or sequencing data in itself reveals an invention, deposit within the common pool would either have to be put on hold until the application is filed, or be kept confidential by the institutional entity until the patent

[434] A retroactive mandatory regulation seems unlikely, as it may not only be politically difficult, but also run counter to contractual obligations regarding the material.

[435] On the environmental impacts of seabed mining and fossil fuel extraction compared to bioprospecting, Ramirez-Llodra, et al., "Man and the Last Great Wildernes", 2011, pp. 11-15.

[436] TRIPS Agreement, article 27(1). There are different understandings of the "novelty" requirement, ranging from an absolute novelty requirement to a local novelty requirement, see Grubb, *Patents for Chemicals, Pharmaceuticals and Biotechnology*, 1999, pp. 54-58.

application is filed. This may depend on how sequencing is divulged or how available the material is in a common pool. If no leniency is given, a bioprospector who is unsure of whether the material will later be used for patented inventions, and deposits material or data, risks being beaten to the patenting by others accessing the common pool. It would thus discourage innovation if the persons sampling the primary material are not awarded a reasonable timeframe for mandatory deposit or confidentiality.

Building upon these considerations, a few general remarks can be made relating to what kind of material or data the common pool would contain: it can contain material that the sampler has the intention to commercialise. For this case, further innovation can consist of almost unlimited pure and applied research. The common pool can also contain data or material that has contributed in a more or less direct manner to a patented invention. Once deposited and made public, the patent protection enjoyed by the patentee and depositor is the same as it would have been without the deposit: the patentee has the exclusive right to prevent third parties from making, using, offering for sale, selling, or importing for these purposes the patented product or process.[437] It would be beneficial to avoid claim infringements and provide clarity, if information on the extent of the patent were available with the sample or data. The limits of further research on the material would then depend on an interpretation of the patent claim. As seen above, research undertaken to understand the sampled material would be permitted.[438] Other rights and obligations may follow from the extent of the research exemption under domestic law. For the case of a global mechanism, harmonisation of applicable rules for this setting would provide increased legal clarity, and thus be a contributing factor to an efficient regime promoting innovation. This objective can be pursued for instance through standard formularies for both deposit of material/data and for access to the common pool.

In this scenario indicated just above, no obligation apart from respecting patents is indicated to fall upon those who use material or data in the common pool. In order to encourage deposits, a scenario where conditions of use fall upon the secondary user can

[437] TRIPS Agreement, article 28.
[438] See above, section 2.1.3.2.

also be envisaged. Both for the case of voluntary and mandatory deposit, use of common pool material that leads to commercial gain may be attributable back to the persons having made the original deposit. This approach contrasts that under the ITPGRFA, where benefits from commercialisation go back to the mechanism. The proposed option would to a lesser degree impede furthering scientific knowledge and research. Placing such obligations would raise the recurring question of how far away from the material or data accessed in the common pool, the new invention must be. This almost meta-variant of ABS could, however, provide a way to ensure that the initial risk-taking is rewarded and problems of so-called free-riders may be limited.

When a researching entity has to disclose the results of its research, there is a risk that this party will seek the broadest patent protection possible for their invention. The common pool idea may increase the already existing challenge of defensive patenting, i.e. patents that do not cover what the patentee does or needs, but blocks innovation from competitors.[439] Ironically, a common pool solution may in this respect contribute to blocking subsequent research. This is a challenge that must be resolved within the patent system and not within the regulation attached to a common pool. In a scenario where parties accessing the common pool can also use these resources for commercial development, there is, at least theoretically, a risk of what can be called doubly defensive patenting. This problem would have to be addressed by the terms of access to the common pool resources.

Compared to the monetary transfer scenario discussed above, this option presents important advantages for the promotion of scientific innovation. It is also a way to render operable the technology transfer provisions of UNCLOS, and thus meet the objectives sought out by the negotiators of the "Constitution for the oceans". If associated with a notification system before venturing onto the high seas, no distinction need be made in any legal document of pure and applied sciences. Rendering what is initially *in situ* common pool resources *de facto* common pool resources, irrespective of economic capacities, may provide fairness

[439] Grubb, *Patents for Chemicals, Pharmaceuticals and Biotechnology*, 1999, p. 434.

and spur innovation. In the larger perspective, a common pool could help justify why patents are, or should be, available for living organisms.

4.3.3. Bioprospecting under flag state jurisdiction

Ships are subject to the exclusive jurisdiction of the state under whose flag it sails.[440] Thus, when the minimum requirements of the law of the sea are met, states are free to regulate the conditions of access to biological material for their nationals. A conceivable option is that of requiring permits for bioprospecting could be associated with obligations share benefits. For parties to the CBD and the NP, the access and benefit-sharing regimes that currently are under development for areas under national jurisdiction could be extended by domestic legislation to their nationals venturing onto the high seas. Even for non-parties to the CBD, there are no legal barriers to implementing such requirements on high seas ABS, though this is less likely.

From a state perspective, there are important political disincentives to enacting such domestic regulation. For monetary benefit-sharing, the same redistributive objectives can be reached through ordinary domestic tax law. For monetary and all other forms of benefits, states have little, if any, incentive to place economic or practical burdens on their nationals when other states do not. It is not within the interest of states to place national research institutions or industry in a position of competitive disadvantage in the international market. Furthermore, were states to enact such regulations, this could create a problem of flag state shopping, at least for the private institutions conducting bioprospecting: private institutions would have an incentive to relocate to states without such measures and sail under the flag of that state.[441] For public research institutions co-operating with private entities, relocating is a less practically accessible option, as they are less mobile than private entities. But the main disincentive remains also for this group; if conditions are applied to their bioprospecting, they might make a less desirable partner for

[440] UNCLOS, article 92(1).
[441] Pursuant to UNCLOS, article 91, there must nonetheless be a "genuine link between the State and the ship".

joint venture bioprospecting with the industry than research institutions without such competitive disadvantages. There is a risk that regulations may be perceived as contrary to innovation for that state. The challenge to such an approach is even greater if no other, or only a few other states, were to enact such legislation: the burden of a Good Samaritan is even heavier to carry alone. No such domestic legislation is known to have been enacted.[442]

4.4. Closing remarks on regulatory options

This discussion shows some of the variety in options that can be considered for high seas benefit-sharing.

It can be remarked that conceiving solutions that specifically target applied research and leave the pure sciences untouched is challenging also in the context of proposing options, both in terms of finding an apt trigger for benefit-sharing and for outlining such options. Avoiding the distinction of pure and applies research leaves greater flexibility in terms of spurring innovation. Yet, given the principles set forth for (at least pure) marine scientific research in UNCLOS, not making a distinction reduces the margin of appreciation of what can be established for mandatory benefit-sharing.

Most of these solutions are confronted with the challenge of how to spur innovation. Yet, some of the options discussed present more substantial drawbacks than others. Mandatory sharing of monetary benefits is particularly hard to construe in a manner that does not conflict with patent law and which spurs innovation.

Building upon the objectives of UNCLOS to make research available is less threatening to the safeguarding of innovation. Perhaps it can even be considered that those providing the biological material can be the recipients of monetary benefits as a *quid pro quo* for having shared benefits in the first place. This is an option that can be conceived under a common

[442] See e.g. Leary, "International Law and the Genetic Resources of the Deep Sea", 2009, p. 363.

pool idea. Yet, the common pool regulatory option can present drawbacks in terms of a limitation of the exclusivity otherwise offered to bioprospectors. Ironically, though, the most important challenges to innovation than can arise under this model are due to patent law, which has as its primary justification the protection of investments and the promotion of innovation.

5. Conclusions

The claim made in 1982 was that UNCLOS is "a comprehensive constitution for the oceans which will stand the test of time".[443] The president of the Third United Nations Conference on the Law of the Sea was partially right, for just as a national constitution, not all questions are answered therein. The legal questions raised by the activity of bioprospecting in the high seas illustrate that while there is little doubt on the applicability of fundamental high seas principles to bioprospecting, uncertainty arises when more concrete provisions are attempted adapted to other uses of the high seas than those originally conceived.

De lege lata, bioprospecting in the high seas is indubitably permitted under international law. By adopting a resource perspective it has been shown that the biological resources of the high seas can be appropriated and also be subject to exclusive intellectual property rights. By adopting an activity perspective, it has been pointed out that the legal grounding for the lawfulness of bioprospecting is a complex question. It is a question that can be answered with opinions, rather than definitive truths. Yet the alternative legal grounds determine what further conditions the activity is subjected to. For a predominately commercial activity, these legal grounds coincide or overlap to various degrees with the rights and obligations under patent law. The overlap is particularly present if bioprospecting is considered regulated by the framework for marine scientific research. Here, the views held by states and commentators on the current legal framework applicable melt with *de lege ferenda* arguments.

It may be that bioprospectors can live comfortably with this uncertainty, as duties under the law of the sea are chiefly placed upon states and not researching entities, while patent law can provide persons with more concrete rights and duties. From a state perspective, the lack of certain answers as to the exact law applicable to bioprospecting can cede ground for the

[443] United Nations General Assembly, *A Constitution for the Oceans*, 1982.

development of customary law. Yet the situation also leaves room for creativity for proponents of benefit-sharing for the high seas. An option is to consider bioprospecting as MSR, a freedom of the high seas currently associated with benefit-sharing elements. In this sense, it could be strategic for proponents of high seas ABS to argue that UNCLOS makes no distinction of pure and applied sciences, and that bioprospecting should be fully subjected to the MSR regime, and consider the various forms under which these elements may be adapted to the new uses of oceanic resources.

The examination of options for ABS in existing instruments provides lessons. But these are chiefly lessons on what has not worked optimally until now. This thesis shows that none of these measures can be transposed without substantial changes to a high seas setting, which underscores the need for creative solutions if benefit-sharing for the high seas is to evolve. The task of the proponents is not an easy one: they are confronted with the fact that they have fewer cards to play in negotiations than in a CBD setting. In contrast to the situation under CBD, access to the resources is open and the *quid pro quo* argument has less direct applicability. As bioprospecting in most cases also is an environmentally sound activity, the main rationale for arguing that new ABNJ instruments should comprise benefit-sharing, is a quite abstract form of fairness. Perhaps ABS could also find its justification in a search for more uniform concepts underlying resource exploitation in both areas within and beyond national jurisdiction. This is equally an abstract reason for advocating change. Credible solutions would then have to have to be constructed with due regard to the interests of those who currently create the benefits.

There probably is no option to high seas ABS without drawbacks. Whether these drawbacks can be justified by the objective of sharing benefits is, in the end, a political question. Providing and further developing these concrete regulatory alternatives may help determine whether there is political room for ABS for bioprospecting in the high seas.

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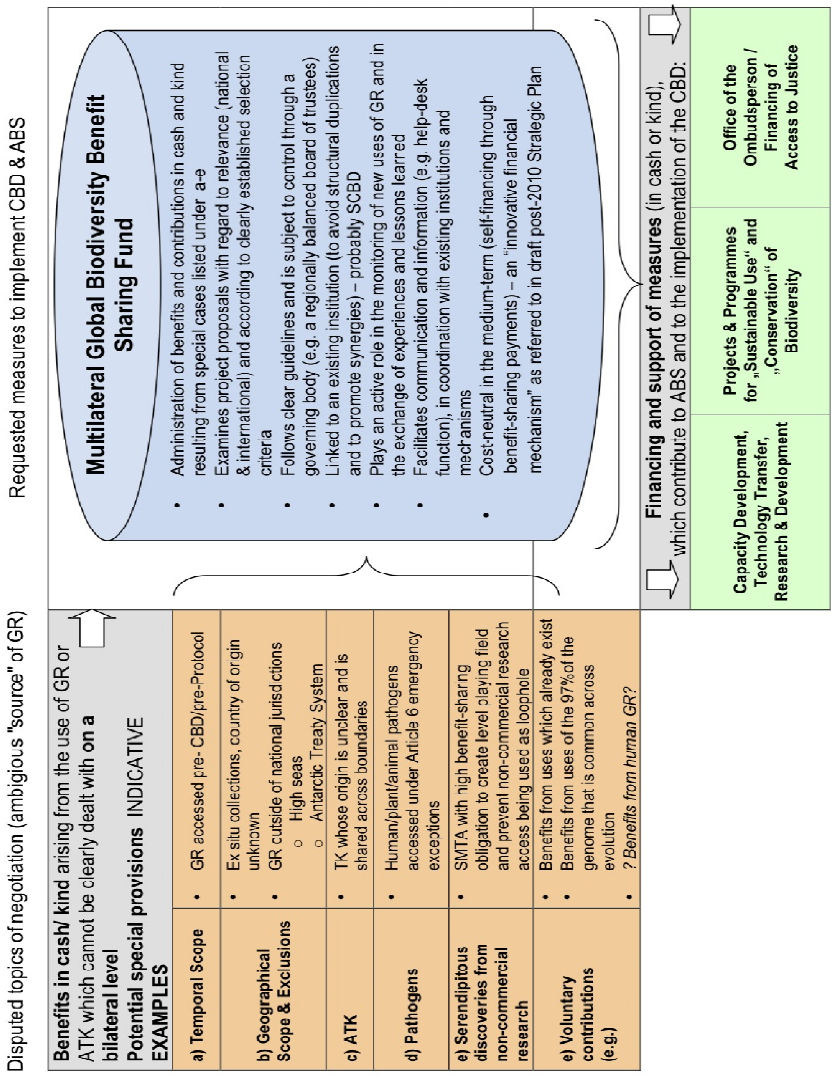
Annex

Non-paper circulated initially in limited numbers, at the resumed meeting of the Ad Hoc Open-ended Working Group on Access and Benefit-Sharing in Montreal July 2010.[444]



[444] Pierre du Plessis, *African Proposal to MLS*, 11 October 2011.